



Kupní smlouva

UTB – DNS laboratorní přístroje a měřící technika 17/2022 - Sestava pro měření polovodičů a polovodičových součástek

uzavřená dle ustanovení § 2079 a násl. zákona č. 89/2012 Sb., občanský zákoník, ve znění pozdějších předpisů (dále jen „*občanský zákoník*“), mezi smluvními stranami, kterými jsou:

Univerzita Tomáše Bati ve Zlíně

veřejná vysoká škola zřízená zákonem č. 404/2000 Sb., o zřízení Univerzity Tomáše Bati ve Zlíně
se sídlem: nám. T. G. Masaryka 5555, 760 01 Zlín
IČO: 70883521
DIČ: CZ70883521
bankovní spojení: Komerční banka, a.s., pobočka Zlín
číslo účtu: [REDACTED]
ID datové schránky: ahqj9id
zastoupená: RNDr. Alexander Černý, kvestor
za věcné plnění odpovídá: [REDACTED]

(dále jen „*kupující*“)

a

H TEST a.s.

se sídlem: Na Hřebenkách 1206/25, 15000 Praha 5
IČO: 25784480
DIČ: CZ25784480
bankovní spojení: ČSOB a.s.
číslo účtu: [REDACTED]
jednatel: Ing. Václav Haasz, předseda předst.
registrace: Městský soud v Praze, B 6041
e-mail: info@hctest.cz
ID datové schránky: sadecjt
kontaktní osoba: [REDACTED]

(dále jen „*prodávající*“)

I. Předmět smlouvy

- 1) Předmětem této smlouvy je závazek prodávajícího odevzdat kupujícímu věc, která je předmětem koupě, dopravit ji do místa určení (viz. čl. III. smlouvy) a umožnit kupujícímu nabytí vlastnického práva k této věci.
- 2) Předmětem této smlouvy je závazek kupujícího věc převzít a zaplatit za ni sjednanou kupní cenu, to vše za podmínek níže v této smlouvě sjednaných.



Č.j.: UTB/22/010760

II. Specifikace věci a cena

- 1) Pro účely této smlouvy se věcí rozumí **sestava pro měření polovodičů a polovodičových součástek** (dále jen „věc“), pořizovaný pro potřeby Centra polymerních systémů Univerzity Tomáše Bati ve Zlíně, s parametry specifikovanými v příloze č. 1 této smlouvy – Technické specifikaci.
- 2) Cena věci je sjednána jako nejvýše přípustná a konečná (vyjma případů, kdy po podpisu této smlouvy dojde ke změně sazeb DPH), přičemž zahrnuje veškeré náklady prodávajícího nezbytné pro splnění jeho povinností z této smlouvy, zejména náklady na dopravu věci a úhradu jakýchkoliv správních či celních poplatků, školení a záruční servis.

Název položky		Počet	Cena za kus bez DPH
B2902B	Precision Source/Measure Unit, 2ch, 100fA resolution, 210V, 3A DC/10.5A pulse	1	207 949,95 Kč
N1297A	Banana - Triax Adapter for 2-wire (non Kelvin) connection	2	10 404,00 Kč
16494A-001	Triaxial Cable (1.5m)	4	5 180,325 Kč
CM_DPP105-M-PTH	BASIC DC PROBE POSITIONER 50TPI MAG BASE WITH PROBE TIP HOLDER	4	35 132,00 Kč
CM_144-390	Triaxial Probe, straight, for Universal Probe Holder, with 30" integrated cable,	4	10 722,00 Kč
CM_PTT-120/4-25	Probe tip, tungsten, 45o, 12 micron, 1 set of 25	1	7 097,00 Kč
CM_PTT-250/4-25	Probe tip, tungsten, 45o, 25 micron, 1 set of 25	1	7 097,00 Kč
CM_M150-ACC-19	Triax Panel, Magnetic Base	1	22 845,00 Kč
HT_Dino_ZTL	USB mikroskop 1.3Mp, 20 - 90x, polarizátor, antireflexní filtr, dlouhá pracovní	1	15 534,00 Kč
HT_Dino_stativ	stativ pro USB mikroskop, rozsah pohybu (H x V) 27 x 15 cm	1	7 148,00 Kč

Cena věci:

Celkem bez DPH: 492.616,25 Kč

21% DPH: 103.449,41 Kč

Celkem s DPH: 596.065,66 Kč

(slovy: pětsetdevadesátšesttisíc šedesátpět korun českých šedesátšest haléřů)

III. Další podmínky plnění, místo a termín plnění

- 1) Prodávající splní svou povinnost dodat věc jejím dodáním, odevzdáním kupujícímu a předáním veškeré související dokumentace (především manuálu v českém jazyce). Věc bude dodána řádně zabalená v zalepených krabicích. O dodání věci bude stranami pořízen protokol, který podepíše oprávnění zástupci obou smluvních stran (dále jen „*protokol*“). Oprávněný zástupce kupujícího je [REDACTED], oprávněný zástupce prodávajícího je [REDACTED].
- 2) Prodávající je povinen nejpozději 2 pracovní dny před zamýšleným dodáním věci kontaktovat oprávněnou osobu kupujícího pro přesné určení, kam má být (do které místnosti) věc dodána.
- 3) Místem plnění (dodání věci) je Univerzita Tomáše Bati ve Zlíně, Centrum polymerních systémů, třída Tomáše Bati 5678, 760 01 Zlín.
- 4) Prodávající je povinen dodat věc nejpozději do **23 týdnů od účinnosti smlouvy**.

IV. Platební podmínky

- 1) Kupující se zavazuje uhradit prodávajícímu cenu věci dle čl. II. této smlouvy na základě daňového dokladu – faktury, vystavené prodávajícím po dodání věci (viz čl. III. odst. 1) této smlouvy), přičemž právo fakturovat vzniká prodávajícímu dnem oboustranného podpisu protokolu. Daňový doklad bude vystaven prodávajícím **do 14 kalendářních dnů** od podpisu protokolu. E-mailová adresa pro příjem elektronických faktur – fakturace@utb.cz.
- 2) **Splatnost faktury je 30 dnů** od jejího doručení kupujícímu. Faktura bude uhrazena bezhotovostním převodem na účet prodávajícího uvedený na faktuře. Kupující neposkytuje zálohy.
- 3) Faktura musí splňovat náležitosti daňového dokladu ve smyslu § 29 zákona č. 235/2004 Sb., o dani z přidané hodnoty ve znění pozdějších předpisů, jinak je kupující oprávněn fakturu vrátit prodávajícímu k opravě, a to až do data její splatnosti. V takovém případě běží lhůta splatnosti faktury nově od počátku dnem doručení opravené faktury kupujícímu. Na faktuře musí být uvedeny také tyto údaje:
 - název zakázky: **UTB – DNS laboratorní přístroje a měřicí technika 11/2022 – Sestava pro měření polovodičů a polovodičových součástek, ID 1921**
 - označení předmětu plnění,
 - fakturovanou částku bez DPH, DPH a včetně DPH.Den uskutečnění zdanitelného plnění nesmí předcházet datu účinnosti smlouvy na základě zveřejnění v registru smluv dle zákona č. 340/2015 Sb., o zvláštních podmínkách účinnosti některých smluv, uveřejňování těchto smluv a o registru smluv (zákon o registru smluv).
- 4) V případě pochybností se má za to, že faktura byla uhrazena dnem odepsání příslušné částky z účtu kupujícího ve prospěch účtu prodávajícího uvedeného na faktuře.
- 5) Platby budou probíhat výhradně v **Kč** a rovněž veškeré cenové údaje budou v této měně.

V. Odpovědnost a záruka

- 1) Prodávající odpovídá za vady, které má věc v době jejího předání a dále v rámci poskytnuté záruky za vady zjištěné po celou dobu záruční lhůty. Prodávající prohlašuje a zavazuje se, že věc bude dodána jako nová, nepoužitá, nerepasovaná, že na ní nevážnou žádné faktické ani právní vady (tj. zejména práva třetích osob).

- 2) Prodávající poskytuje kupujícímu záruku za to, že věc bude mít po dobu záruční lhůty vlastnosti stanovené touto smlouvou, příslušnými právními předpisy a normami, případně vlastnosti obvyklé a že bude plně použitelná ke sjednanému účelu, popř. k účelu obvyklému (dále též jen „záruka“).
- 3) Záruční doba běží počínaje oboustranným podpisem protokolu a činí **36 měsíců pro analyzátor a 24 měsíců pro příslušenství** od předání věci na základě podepsaného předávacího protokolu.
- 4) V době záruční lhůty nebude za opravy účtován materiál, komponenty, práce za odstranění závad, cestovní či jiné náhrady.
- 5) Délka záruční doby se automaticky prodlužuje o počet dnů uplynulých od ohlášení závady až do jejího úplného odstranění.
- 6) Záruka se nevztahuje na poškození věci způsobené kupujícím neodborným zásahem nebo nesprávnou obsluhou a dále na škody způsobené zásahem třetí osoby a vyšší mocí.
- 7) Reklamací odešle kupující písemně na adresu sídla prodávajícího, datovou zprávou dle příslušného právního předpisu či e-mailem na výše uvedenou e-mailovou adresu, přičemž volba způsobu oznámení reklamacie přísluší kupujícímu. V reklamaci musí být vada popsána včetně toho, jak se projevuje.
- 8) Prodávající je povinen reklamovanou vadu odstranit (nedohodnou-li se strany písemně jinak) v nejkratší možné lhůtě vzhledem k povaze dané vady, přičemž pro vyloučení pochybností spolu oprávnění zástupci smluvních stran přesnou délku takové lhůty dohodnou. Nedojde-li k takové dohodě, je prodávající povinen reklamovanou vadu odstranit do 15 dní od doručení reklamacie a to buď provedením opravy nebo výměnou celé věci za novou ve stejné nebo vyšší kvalitě. O odstranění vady sepíše smluvní strany zápis.
- 9) Záruční opravy budou poskytovány dodavatelem věci, výrobcem věci nebo smluvním servisním partnerem výrobce, kterým je pro účely plnění této smlouvy H TEST a.s., Šafránkova 3, 15500 Praha 5, www.htest.cz.
- 10) Za provedení záruční opravy nepřísluší prodávajícímu jakákoliv kompenzace souvisejících nákladů.
- 11) Smluvní strany se dále dohodly, že vady věci, na které se nevztahuje záruka, je prodávající povinen na žádost kupujícího odstranit, a to v přiměřeném termínu a za svých standardních cenových podmínek.
- 12) Prodávající se zavazuje poskytovat kupujícímu k předmětu koupě pozáruční servis, a to po dobu **60 měsíců** s tím, že prodávající garantuje to, že budou k dispozici náhradní díly. Pozáruční servis bude fakturován dle této smlouvy za standardních cenových podmínek prodávajícího v okamžiku realizace servisního zásahu. Cena pozáručního servisu není součástí ceny věci dle čl. II odst. 2 této smlouvy.

VI. Sankce

- 1) Při prodlení kupujícího s úhradou kupní ceny věci je kupující povinen uhradit prodávajícímu úroky z prodlení ve výši dle příslušného právního předpisu.
- 2) Při prodlení prodávajícího s dodáním věci ve sjednaném termínu je prodávající povinen uhradit kupujícímu smluvní pokutu ve výši 0,1 % z ceny věci včetně DPH za každý započatý den prodlení maximálně však do 100 % ceny věci dle čl. II odst. 2 této smlouvy.
- 3) Smluvní pokuty dle této smlouvy jsou splatné do 15 dnů od doručení jejich písemného vyúčtování povinné straně.

- 4) Při prodlení prodávajícího s provedením záruční opravy ve lhůtách stanovených touto smlouvou, případně pokud nezapůjčí náhradní zařízení o stejné nebo vyšší kvalitě, uhradí prodávající kupujícímu smluvní pokutu ve výši 500 Kč za každý i započatý den, o který provedení záruční opravy přesáhne lhůtu vymezenou dle čl. V, odst. 8 této smlouvy.
- 5) Ujednání o smluvních pokutách nemají vliv na náhradu škody, její uplatnění ani vymáhání.

VII. Odstoupení od smlouvy

- 1) Poruší-li jakákoli strana smlouvu podstatným způsobem, může druhá strana bez zbytečného odkladu od smlouvy odstoupit. Podstatné je takové porušení povinností, o němž strana porušující smlouvu již při uzavření smlouvy věděla nebo musela vědět, že by druhá strana smlouvu neuzavřela, pokud by toto porušení předvíдалa; v ostatních případech se má za to, že porušení podstatné není.
- 2) Strana může od smlouvy odstoupit bez zbytečného odkladu poté, co z chování druhé strany nepochybně vyplyne, že poruší smlouvu podstatným způsobem, a nedá-li na výzvu oprávněné strany přiměřenou jistotu.

VIII. Závěrečná ustanovení

- 1) Prodávající bere na vědomí, že je osobou povinnou spolupůsobit při výkonu finanční kontroly dle § 2 písm. e) zákona č. 320/2001 Sb., o finanční kontrole ve veřejné správě, v platném znění.
- 2) Prodávající se zavazuje, že umožní všem subjektům oprávněným k výkonu kontroly, z jejichž prostředků je plnění dle této smlouvy hrazeno, provést kontrolu dokladů souvisejících s tímto plněním, a to po dobu danou právními předpisy ČR k jejich archivaci (zákon č. 563/1991 Sb., o účetnictví, v platném znění a zákon č. 235/2004 Sb., o dani z přidané hodnoty, v platném znění).
- 3) Práva a povinnosti smluvních stran vznikající z této smlouvy a výslovně neupravené jejím zněním se řídí právními předpisy České republiky s vyloučením případných kolizních norem, a to zejména občanským zákoníkem.
- 4) Tuto smlouvu lze měnit či doplňovat pouze písemnými číslovanými dodatky, které budou za dodatek smlouvy výslovně označeny a podepsány oprávněnými zástupci obou smluvních stran.
- 5) Je-li nebo stane-li se kterékoliv ustanovení této smlouvy v jakémkoli směru nezákonným, neplatným či nevykonatelným, zákonost a vykonatelnost zbývajících ustanovení této smlouvy tím nebude dotčena ani oslabena. Smluvní strany se zavazují, že jakékoli takové nezákonné, neplatné nebo nevykonatelné ustanovení nahradí novým, které bude nezákonné, neplatné či nevykonatelnému ustanovení svým významem co nejblíže.
- 6) Tato smlouva je vyhotovena v písemné formě a každá smluvní strana k ní připojuje v souladu s příslušnými ustanoveními zákona č. 297/2016 Sb., o službách vytvářejících důvěru pro elektronické transakce, svůj kvalifikovaný elektronický podpis.
- 7) Tato smlouva nabývá platnosti dnem přiložení elektronického podpisu poslední smluvní strany a účinnosti dnem uveřejnění v centrálním registru smluv v souladu se zákonem č. 340/2015 Sb., o zvláštních podmínkách účinnosti některých smluv, uveřejňování těchto smluv a o registru smluv (zákon o registru smluv).

8) Nedílnou součástí této smlouvy je **příloha č. 1** – podrobná technická specifikace věci.

Ve Zlíně dne: 3. 6. 2022

V Praze dne: 3. 6. 2022

Za kupujícího:

Za prodávajícího:

.....
RNDr. Alexander Černý
kvestor UTB ve Zlíně

.....
Ing. Václav Haasz
Předseda představenstva H TEST a.s.

(podepsáno elektronicky)

Odpovídá	Datum	
PO/OO	2.6.22	
EO	2.6.22	
Věcně	3.6.22	
Správce rozpočtu	3.6.2022	

1) 1921- UTB plus HP 17/2022 -
SESTAVA PRO NĚKTERÉ TOLKOVÁČI
A TOLKOVÁČOVÝMI SOUČÁSTI EK.

Příloha č. 1 - Technická specifikace

UTB – DNS laboratorní přístroje a měřicí technika 17/2022 - Sestava pro měření polovodičů a polovodičových součástek

IDENTIFIKAČNÍ ÚDAJE ZADAVATELE

Obchodní název:	Univerzita Tomáše Bati ve Zlíně
Sídlo:	nám. T. G. Masaryka 5555, 760 01 Zlín
IČO:	70883521
Rektor:	prof. Ing. Vladimír Sedlařík, Ph.D.

Předmět veřejné zakázky:

Předmětem veřejné zakázky je dodávka sestavy pro měření polovodičů a polovodičových součástek pro potřeby Centra polymerních systémů Univerzity Tomáše Bati ve Zlíně.

Specifikace předmětu veřejné zakázky: Keysight B2902B

Součástí dodávky je modulární polovodičový analyzátor (sestava) s následujícími parametry:

- umožňující měřit stejnosměrné, střídavé, pulzní i dynamické voltampérové křivky,
- součástí analyzátoru je grafický displej,
- připojení bezpečnostními 4 mm banánky,
- 2 nezávislé kanály SMU (source measure unit),
- napětový/proudový zdroj s min. rozlišením napětí 1 μ V a proudu 1 pA,
- měřicí rozsahy jsou minimálně 100 nA – 3 A, 100 mV – 200 V,
- vzorkovací rozlišení 20 μ s,
- softwarové rozhraní angličtina,
- součástí analyzátoru je USB, LAN a GPIB port pro stahování výsledků,
- ovládací software analyzátoru kompatibilní s OS Windows,

Součástí dodávky je příslušenství, které obsahuje:

- 4 ks nízkošumových triaxiálních kabelů (1,5 m), - 4x Keysight 16494A-001
- adaptér na triaxiální sondy pro oba kanály, - 2x Keysight N1297A
- 4 ks pozicionéru pro triaxiální sondy s rozlišením max. 5 μ m - 4x CM_DPP105-M-PTH
- 4 ks triaxiální sondy, - 4x CM_144-390
- 25 ks zahnutých hrotů k triaxiálním sondám (12 μ m), - CM_PTT-120/4-25
- 25 ks zahnutých hrotů k triaxiálním sondám (25 μ m), - CM_PTT-250/4-25
- 1 ks digitální USB mikroskopické kamery (zvětšení až 90x) s polarizačním filtrem a velkou pracovní vzdáleností (min. 50 mm), - HT_Dino_ZTL
- stojan pro mikroskopickou kameru, - HT_Dino_stativ
- 1 ks triaxiálního panelu, - CM_M150-ACC-19

Záruční lhůta na modulární polovodičový analyzátor činí 36 měsíců a na příslušenství 24 měsíců.

Požadovaný počet: 1 ks

DATA SHEET

B2900B / B2900BL Series Precision Source/Measure Unit

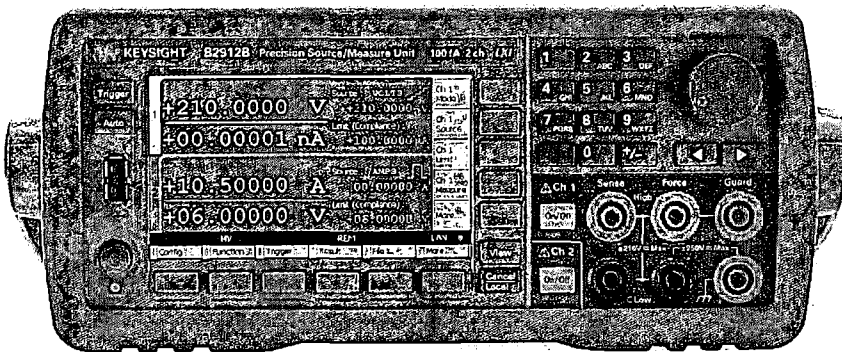


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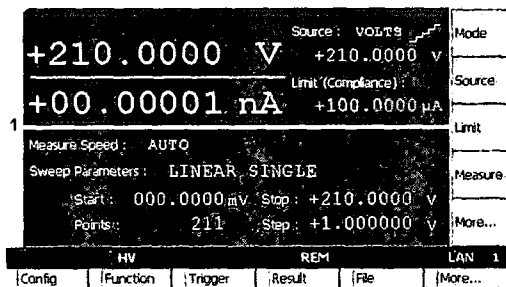
Get Rapid and Accurate Measurement Results

The Keysight B2900B/BL Series Precision Source/Measure Units are compact and cost-effective bench-top Source/Measure Units (SMUs) with the capability to source and measure both voltage and current. These capabilities make the B2900B/BL Series SMU ideal for a wide variety of IV (current versus voltage) measurement tasks that require both high resolution and accuracy.

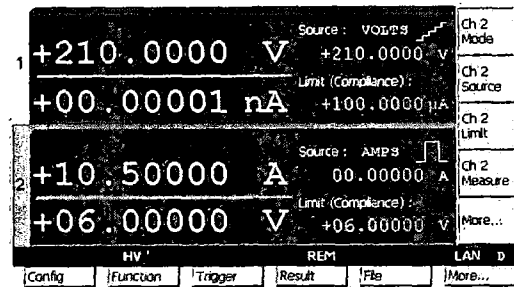
The B2900B/BL Series SMU has a voltage maximum of ± 210 V, a current maximum ± 3 A DC, and ± 10.5 A pulsed sourcing capabilities. With a precision minimum of 10 fA/100 nV sourcing and measuring resolution, a color LCD graphical user interface (GUI) and several task-based viewing modes will improve your productivity for test, debug, and characterization.

The B2900B/BL Series SMU offers superior measurement throughput and supports conventional SMU SCPI commands for easy test code migration. These features improve efficiency and lower the cost of ownership when integrating the SMUs into systems for production test.

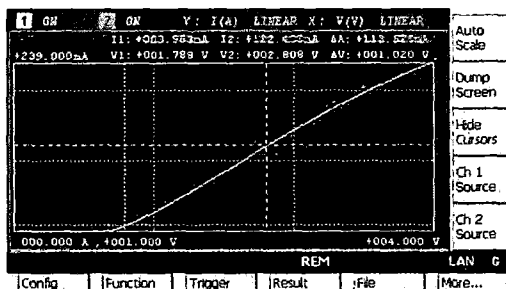
The B2900B/BL Series SMU consists of six models — the B2901BL, B2910BL, B2901B, B2902B, B2911B, and B2912B. The differentiation between the models is according to their available features: output range, number of digits displayed, measurement resolution, minimum timing interval, viewing modes, and SMU channels. These model choices make it easy for selecting the performance and price you need for your testing requirements.



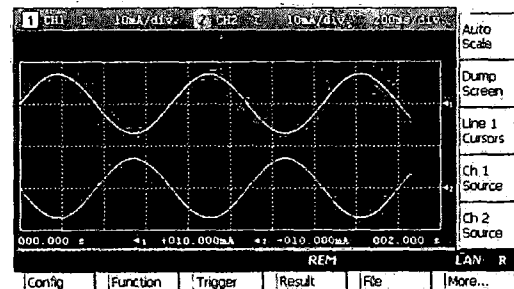
Single View



Dual View



Graph View



Roll View

Feature	Benefit
Integrated 4-quadrant sourcing and measuring capabilities	Easily and accurately measure current and voltage using a single instrument without the need to manually change any connections
Measurement range: ± 210 V, ± 3 A (DC), ± 10.5 A (pulsed)	A single SMU product covers both high voltage and high current measurement needs, allowing for more standardization and simplifying inventory and support concerns.
Source and measurement resolution down to 10 fA and 100 nV	Can make low-level measurements using a low-cost bench-top SMU that were previously only possible using a more expensive semiconductor device analyzer.
User-friendly front panel GUI with 4.3 inch color LCD display supports both graphical and numerical view modes	Can quickly and easily perform measurements and display data on the front panel, thereby greatly speeding up interactive test, characterization and debug operations.
10 microsecond digitizing capability	Can capture low frequency phenomena in addition to DC characteristics
PC-based control software	Can make measurements remotely from a PC without the need to program.
Supports both conventional and default SCPI commands	Conventional SCPI commands provide some compatibility with older SMU code (such as Keithley 2400 series) to minimize code conversion work. Default SCPI commands support advanced B2900B/BL Series features
Small form factor with USB2.0, LAN, GPIB and digital I/O interfaces	Easy integration into rack and stack systems.

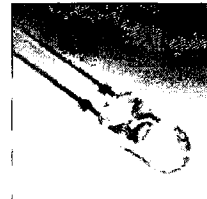
The Best SMU Solution for a Broad Range of IV Measurements

SMUs are popular and widespread instruments for performing IV measurements in many different fields and applications due to their integrated voltage and current sourcing and measurement capabilities. The B2900B/BL Series SMU provides superior performance and usability at a very reasonable price. In addition, the B2900B/BL Series SMU supports many functions to speed up production test and increase throughput. The versatile measurement capabilities of the B2900B/BL Series SMU make it an ideal choice for a variety of IV measurements such as semiconductor test, active/passive component test and general electronic device and material characterization.

The B2900B/BL Series SMU has a broad application range that spans uses from R&D and education to industrial development, production test and automated manufacturing. Moreover, they work equally well as either standalone or system components.

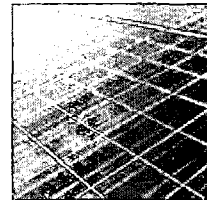
Testing semiconductors, discrete and passive components

- Diodes, laser diodes, LEDs
- Photodetectors, sensors
- Field effect transistors (FETs), bipolar junction transistors (BJTs)
- ICs (analog ICs, RFICs, MMICs, etc)
- Resistor, varistor, thermistors, switches



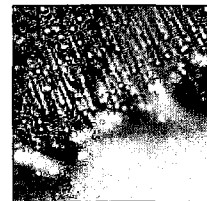
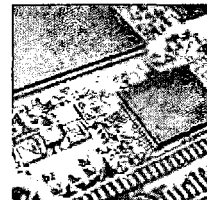
Testing precision electronics and green energy devices

- Photovoltaic cells
- Power transistors, power devices
- Battery
- Automotive
- Medical instruments
- Power and DC bias source for circuit test



Research and education

- New material investigations
- Nano devices characterization (e.g. CNT)
- Giant magnetic resistance (GMR)
- Organic devices
- Any precise voltage/current source and measurement



Application literature is available on the Keysight web site. For more information please visit www.keysight.com/find/precisionSMU

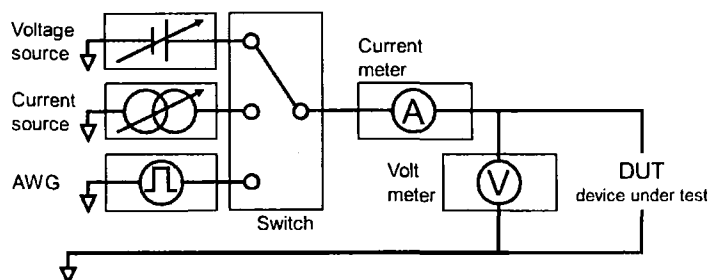
Integrated Source and Measurement Capabilities Simplify Difficult IV Measurement Tasks

The B2900B/BL Series SMU reduces measurement complexity

Performing IV measurements with conventional instruments such as voltage/current sources, arbitrary waveform generators (AWGs), switches, and voltage/current meters is complicated and confusing. It requires deep technical knowledge of both the measurement technique and the instrumentation to perform an accurate measurement.

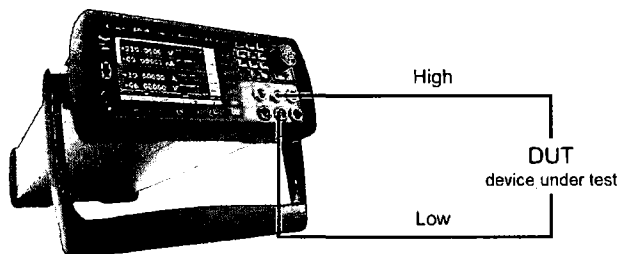
The B2900B/BL Series SMU integrates many different source and measurement capabilities into one compact form factor. It can operate as a seamless 4-quadrant precision voltage/current source, an electrical load, an accurate voltage/current meter, a pulse generator and an AWG. Its versatile all-in-one integrated source and measurement capabilities allow it to perform a wide variety of measurements from DC to low frequency AC without the need to change connections or use additional equipment. Moreover, the availability of 2-channel models supports the testing of devices with up to three terminals (as long as one terminal can be tied to the circuit common).

If you wish to learn more about the advantages of using SMUs to make IV measurements, then please refer to the section at the back of this datasheet entitled "Overview: Why use an SMU?"



Rack & stack solution:
Multiple instruments connected with no easy means to coordinate them.

Same measurement using an SMU



SMU solution:
Integrated 4-quadrant voltage and current sourcing and measurement (including AWG function).

Wide Voltage and Current Coverage for Testing a Variety of Devices

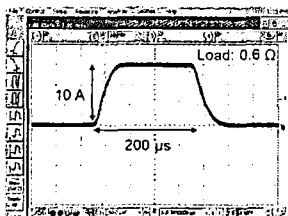
Test up to 210 V and 3 A (DC) or 10.5 A (pulsed) with a single instrument

The B2900B SMUs can source and measure ± 210 V and currents of ± 3 A DC, or ± 10.5 A pulsed. This performance versatility enables you to standardize on a single SMU model, which minimizes support costs. These capabilities are present on both single- and dual-channel versions. Both channels in the 2-channel version operate independently.

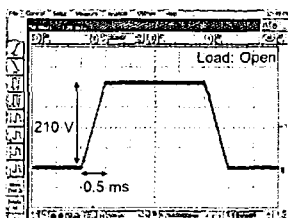
Integrated sweep and arbitrary waveform measurement functionality

The B2900B/BL Series SMU has capabilities that allow it to perform more than just simple DC and pulsed measurements. The B2900B/BL Series SMUs have a built-in sweep capability that supports all of the standard sweep parameters such as linear and logarithmic modes, single and double sweep functions and constant and pulsed sweep operation. The B2900B/BL Series SMU's GUI fully supports the sweep measurement function, thereby allowing sweep measurements to be made and displayed quickly from the instrument front panel. Of course, the user can also make the same sweep measurements just as efficiently on the B2900B/BL Series SMU under remote control using SCPI commands. This integrated sweep measurement capability improves efficiency and reduces measurement setup time.

The B2900B/BL Series SMU has arbitrary waveform generation (AWG) and list sweep capabilities. The AWG and list sweep functions enable you to create waveforms with up to 100,000 steps for maximum flexibility while the B2901BL SMU has up to 10,000 steps. You can specify a waveform of arbitrary shape using familiar spreadsheet compatible data-entry formats. The AWG and list sweep features are especially useful when characterizing devices where the response varies depending on the applied voltage or current. You now have the flexibility to focus on areas of interest.

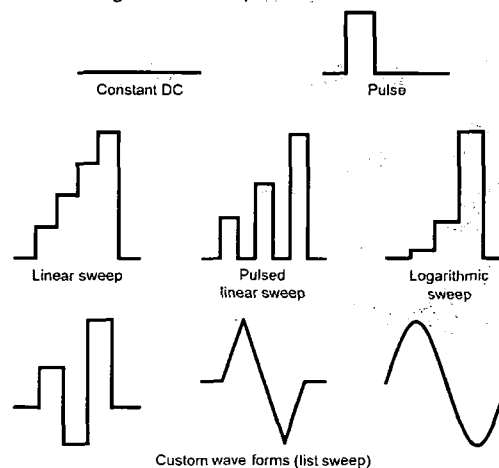


You can create current pulses of up to 10.5 amps, which helps to minimize device self-heating effects.



You can ramp up to a voltage of 200 V in 0.5 millisecond, which is useful for evaluating high-power components.

Built-in functions provide flexible waveform generation capabilities



Superior Bench-top SMU Measurement Performance

Source and measurement resolution - 10 fA and 100 nV

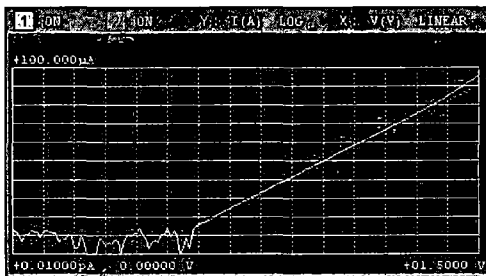
The B2900B Series SMU consists of four models — the differentiation is between the number of channels, and measurement and sourcing resolution. The B2901B (single-channel) and B2902B (dual-channel) SMUs have 100 fA and 100 nV measurement resolution, 1 pA, and 1 μ V sourcing resolution. The B2911B (single-channel) and B2912B (dual-channel) SMUs have 10 fA and 100 nV both measurement and sourcing resolution.

The B2900BL Series SMU consists of two models. The B2901BL SMU has 1 pA and 100 nV measurement resolution, 10 pA, and 1 μ V sourcing resolution. The B2910BL SMU has 10 fA and 100 nV measurement resolution, 100 fA, and 1 μ V sourcing resolution.

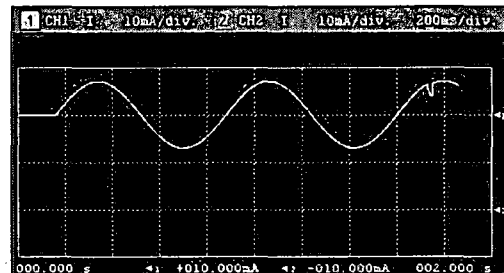
The B2900B/BL Series SMUs support popular banana jack style inputs for cost-effective and flexible connectivity. For low current measurements below 1 nA, banana jack to triaxial adapters are available.

Capture transient phenomena effortlessly

The B2900B/BL Series SMUs support a high-speed sampling measurement function that permits the capture and display of low-frequency transient phenomena. The B2901BL and B2910BL SMUs support a 200 μ s (5,000 points/second) and 50 μ s (20,000 points/second) sampling rate. The B2901B and B2902B SMUs support a 20 μ s (50,000 points/second) sampling rate, and the B2911B and B2912B SMUs support a 10 μ s (100,000 points/second) sampling rate. The maximum achievable sampling rate depends on many factors, including signal level, ambient noise, and desired resolution.



You can make and display accurate low-current measurements directly on the B2900B/BL front panel.



Roll view mode allows you to capture low-frequency transient phenomena.

4-wire measurement capability permits accurate low resistance measurement

When measuring small resistances the innate cable resistance can create serious measurement error. To solve this, the B2900B/BL Series SMU supports a 4-wire (also known as a remote sense or Kelvin connection) measurement function. In the 4-wire scheme two of the connectors force current and the other two connectors measure voltage. Since the connectors measuring voltage do not have any current flowing through them, they can accurately sense the actual voltage at the DUT.

Measure large capacitive loads without oscillation

Large capacitive loads can sometimes cause SMUs to oscillate. To mitigate this, the B2900B/BL Series SMU supports a high capacitance measurement mode. The high capacitance mode enables the measurement of large capacitive loads without having to worry about SMU oscillation.

Fast Throughput Lowers Cost-of-test

Best-in-class measurement throughput

Although an excellent R&D tool, the B2900B/BL Series SMU is also well-suited for production test. It can achieve excellent accuracy and repeatability at even short integration times. The B2900B/BL Series SMU possesses the fastest measurement speed of any SMU in its class.

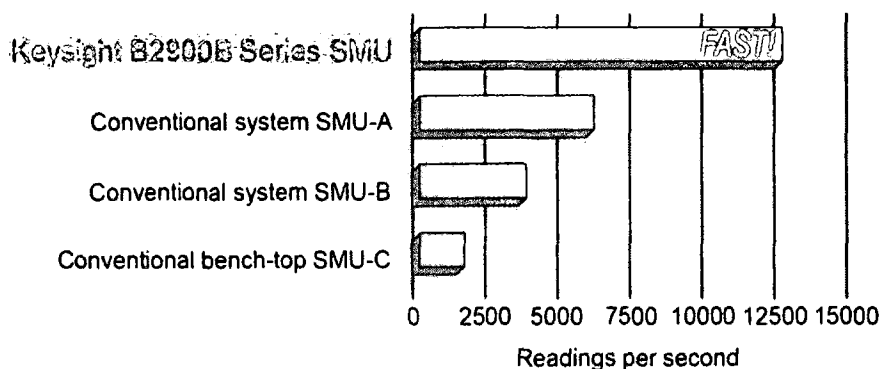
Program memory and trace buffer features improve throughput

To reduce bus communication time, the B2900B/BL Series SMUs support a program memory feature that enables you to store long strings of SCPI commands within the instrument. You can execute these code sequences by sending a single command across the communication bus to improve throughput for frequently performed command strings. The B2900B/BL Series SMUs support a trace buffer that can store up to 100,000 data points while the B2901BL stores 10,000 data points. Downloaded results from multiple measurements are available at once to improve overall throughput while reducing the data transfer time.

SCPI commands provide compatibility and versatility

Standard Commands for Programmable Instruments (SCPI) are a popular and easy-to-understand instrument control protocol. The B2900B/BL Series SMU supports two SCPI command sets, conventional and default, to provide both code compatibility and flexibility. The conventional command set has a large number of its commands compatible with those of older SMUs (such as the Keithley 2400) to minimize code conversion work. The default command set supports advanced B2900B/BL Series SMU features and they should be used to fully utilize its performance and capabilities.

Maximum sweep operation reading rate per second
(Source/measure to GPIB at 50 Hz)



Overview: Why Use an SMU?

Resource integration reduces measurement error

An SMU is an instrument that combines the capabilities of a current source, a voltage source, a current meter and a voltage meter (along with the capability to switch easily between these various functions). Because the source and measurement circuitry are closely integrated, the user can achieve far better measurement performance with less measurement error than would be possible by using various independent instruments to make the same measurement.

Feedback mechanism stabilizes voltage and current sourcing

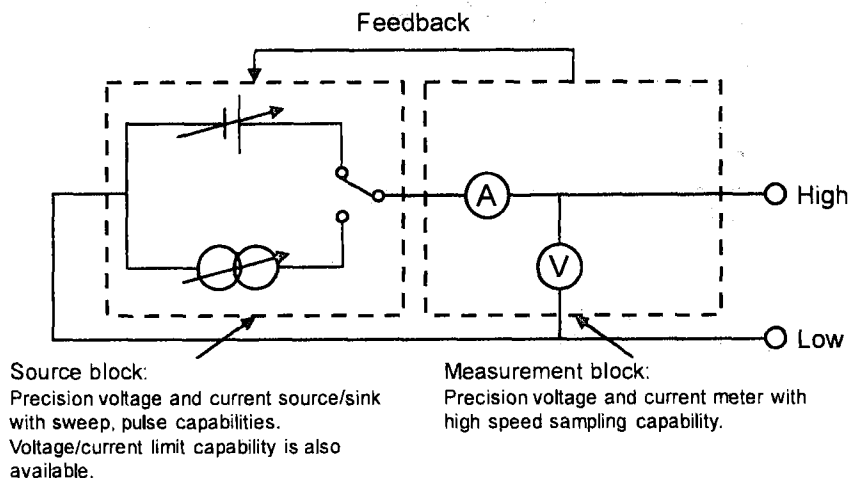
Since SMUs have the ability to very accurately measure their own current and voltage output, they have many advantages over conventional power supplies. All SMUs have internal feedback loops that provide instantaneous feedback to the sourcing circuitry, which in-turn allows the SMU output to remain accurate and stable even if the load conditions change unexpectedly.

Limit (compliance) feature prevents device damage

SMUs also possess a voltage and current limit (compliance) feature that allows the user to set limits and to protect devices from damage caused by excessive voltage or current. Although the SMU normally continues to function when it reaches the user-specified limit value, it can also be set to shutdown just like the over current protection (OCP) and over voltage protection (OVP) functions do on a power supply.

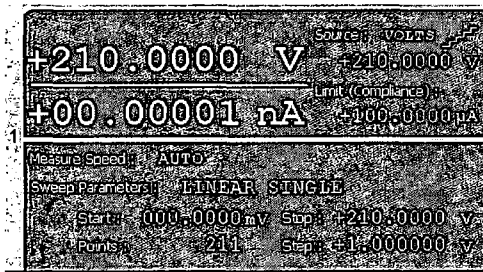
Accurate timing control of source and measurement resources

The integration of the source and measurement resources in an SMU allows much tighter synchronization than would be possible with separate instruments. Moreover, the B2900B/BL Series SMU provides very flexible triggering options that allow the measurements points to be defined independently from the sourced current or voltage waveform. On two channel units you can operate both channels in synchronization or independently, and under remote control you can trigger multiple units in unison using a group trigger signal.



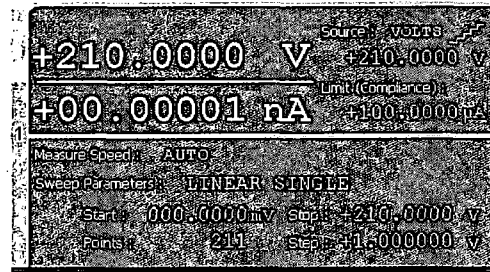
Innovative GUI and 4.3" Color LCD Display Facilitate Fast Bench-top Test, Debug and Characterization

The B2900B /BL Series SMU's front panel has many features that make interactive use fast and friendly. These include a 4.3" color LCD display, a USB2.0 memory I/O port, an assist key, an alphanumeric keypad and a rotary knob. The 4.3" color LCD display supports both graphical and numerical view modes and enables test setup and check test results quickly. The USB2.0 memory port supports easy data storing and porting. The Innovative graphical user interfaces, such as single view, dual view, graph view, roll view and zoom, improves usability and productivity of bench-top tests, debug and characterizations dramatically.



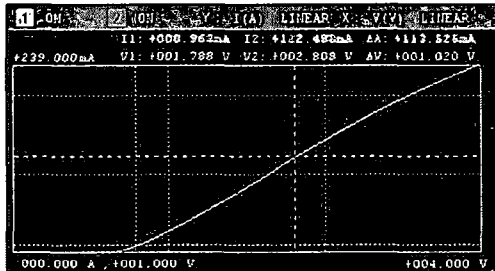
Single view:

Single view provides basic and advanced settings and display capabilities for the selected channel from the front panel of the instrument. No additional controller or software is required.



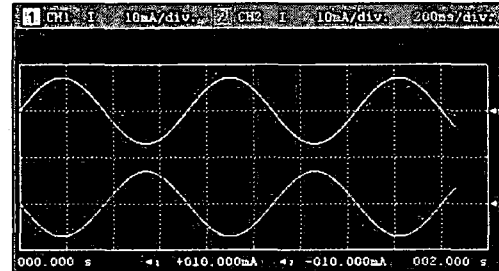
Dual view:

Dual view provides the basic settings and display capabilities for both channels 1 and 2. Up to 6 digits can be displayed in dual view mode. This mode is available only for the B2902B / B2912B.



Graph view:

Graph View displays measurement results on XY graphs (such as I-V and H/V-t curves) on up to 2 channels. This is useful for quick evaluation of device characteristics, especially those obtained from sweep measurements.



Roll view:

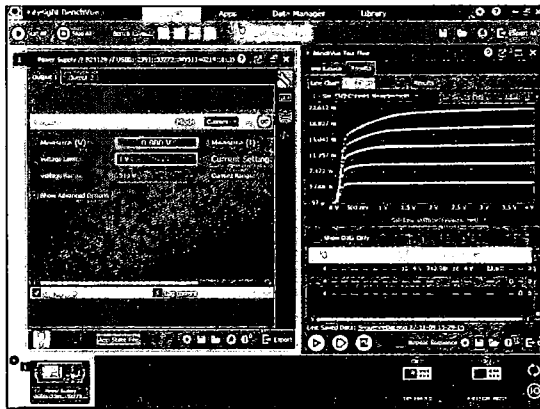
Roll view draws I-t or V-t curves similar to the curves drawn by a strip chart recorder. Up to 1000 acquired data points can be displayed and updated while the measurement is still in progress. Roll view's continuous measurement capability is especially useful for monitoring low frequency phenomena. Roll view is available only for the B2911B / B2912B.

Multiple Remote Control Choices Optimize Performance for Different Applications

The B2900B/BL Series SMU offers multiple options for instrument remote control at little or no cost. Four solutions are available: PathWave BenchVue, B2900B/BL Graphical Web Interface, B2900 Quick IV Measurement Software, and EasyEXPERT group+. These multiple software control options allow you to choose the solution that best fits your particular application.

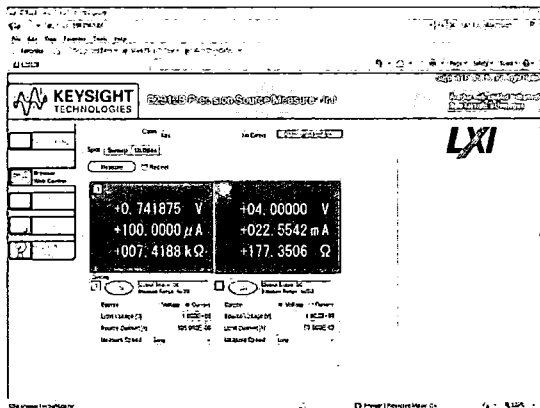
PathWave BenchVue

PathWave BenchVue allows you to control the B2900B/BL Series SMUs as voltage/current sources from a PC without the need to do any programming. In addition, because PathWave BenchVue supports a wide variety of Keysight instruments (oscilloscopes, meters, etc.) it is a good choice when you need to integrate together many different types of instruments on a benchtop.



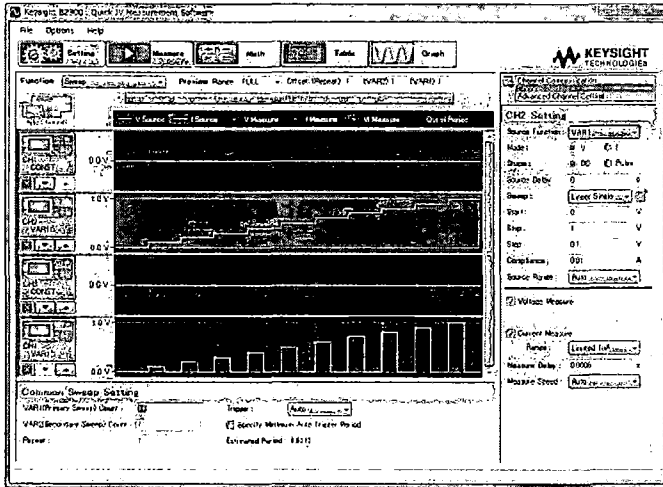
Graphical Web Interface

The Keysight B2900B/BL Series SMU has a built-in LXI compliant web server that allows any Java enabled web browser (such as Internet Explorer) to control it over the LAN. The graphical web interface supports all of the basic measurement functions such as spot measurements, sweep measurements and pulsed source measurements. Since no special software is required this feature is convenient for making quick measurements on the fly.



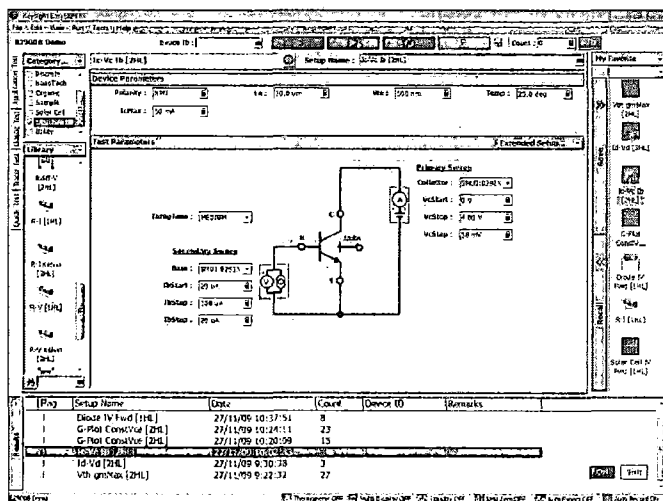
Quick I/V Measurement Software

Keysight B2900 Quick I/V Measurement Software permits easy measurement setup and execution on a Windows-based PC. It has a user-friendly GUI that can be used with all of the B2900B/BL Series SMU's interfaces (LAN, USB and GPIB). It can control up to four SMU channels in any configuration of single and dual channel units.



EasyEXPERTgroup+

Keysight EasyEXPERT group+ provides a powerful IV parametric characterization solution for a wide range of devices and materials. It has an intuitive mouse and keyboard driven graphical user interface that simplifies common characterization tasks such as test setup and execution, data analysis, data management/protection, etc. Moreover, since it can support up to eight SMU channels (four 2-channel SMU units) EasyEXPERT group+ makes it easy to characterize multi-terminal devices.



Available Accessories Facilitate Special Test Needs

Easy banana jack connectivity with various accessories

The B2900B/BL Series SMU uses convenient and low-cost banana jack terminals, which support a variety of cables, adaptors and accessories.

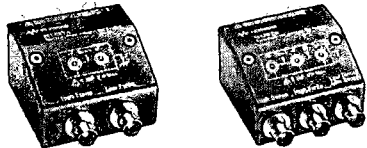
Banana to triaxial adaptor for low current measurement

Since banana jacks cannot support low current measurement (i.e. measurements of 1 nA and below), a banana jack to triaxial adapter is available to permit the use of high-performance triaxial cables. This makes it easy to connect to both triaxial-based test fixtures and wafer probers. Of course, both 2-wire and 4-wire triaxial adapters are available.

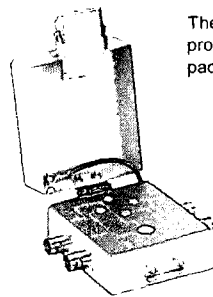
Test fixtures for testing packaged devices

The Keysight N1295A Device/Component Test Fixture provides a low-cost solution to quickly and easily test packaged devices and components. It has four triaxial inputs and supports voltage and current measurements of up to 42 V and 1 A.

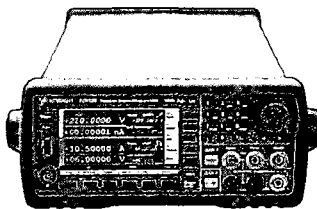
For more advanced packaged testing needs, the Keysight 16442B test fixture provides more capabilities. It offers support for higher pin count devices, more flexible connectivity and an interlock feature for safely applying voltages greater than 42 V. Keysight can supply adapters to use the 16442B interlock with the B2900B/BL Series SMU's digital output.



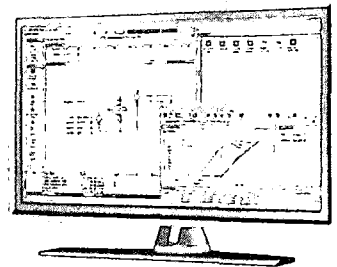
Banana jack to triaxial adapters are available in both 2-wire and 4-wire versions.



The Keysight N1295A Device/Component Test Fixture provides a low-cost solution to quickly and easily test packaged devices and components.



Using the available accessories and furnished software you can create a low-cost PC-based component testing solution.



Comparison table by model

Model number		B2901B/L	B2910B/L	B2901B/ B2902B	B2911B/ B2912B
Number of channels		1	1	1 or 2	1 or 2
Output range	Max. voltage	21 V	210 V	210 V	210 V
	Max. current (DC)	1.5 A	1.5 A	3.03 A	3.03 A
	Max. current (Pulse)	No	No	10.5 A	10.5 A
Source resolution	Digit	5.5 digit	5.5 digit	5.5 digit	6.5 digit
	Min. voltage	1 μ V	1 μ V	1 μ V	100 nV
	Min. current	10 pA	100 fA	1 pA	10 fA
Lowest current range		1 μ A	10 nA	100 nA	10 nA
Measurement resolution	Digit	6.5 digit	6.5 digit	6.5 digit	6.5 digit
	Min. voltage	100 nV	100 nV	100 nV	100 nV
	Min. current	1 pA	10 fA	100 fA	10 fA
Min. trigger interval		200 μ s	50 μ s	20 μ s	10 μ s
Max. trigger count		10,000	100,000	Infinite	Infinite
Max. data buffer size		10,000	100,000	100,000	100,000
Limit test		No	Yes	Yes	Yes
Fast transient mode		No	No	Yes	Yes
Easy file access		No	No	Yes	Yes
View mode	Single view	Yes	Yes	Yes	Yes
	Dual view	No	No	Yes (B2902B)	Yes (B2912B)
	Graph view	Yes	Yes	Yes	Yes
	Roll view	No	No	No	Yes

Specifications

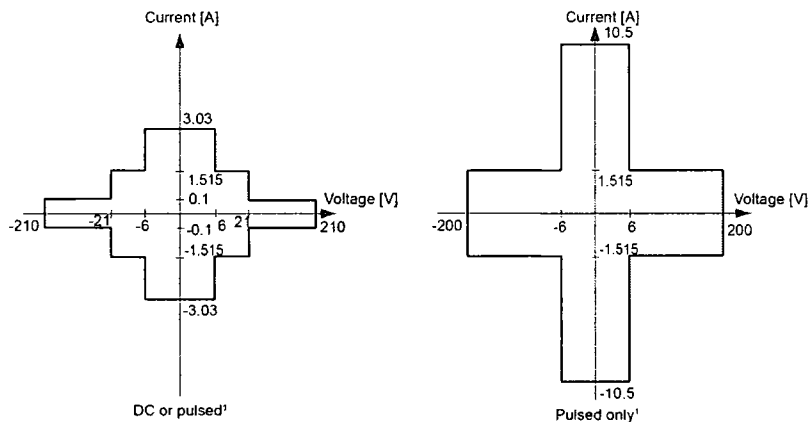
Specification conditions

Temperature	23 °C ±5 °C
Humidity	30% to 80% RH
After 60 minutes warm-up	Ambient temperature change less than ±3 °C after self-calibration execution
Calibration period	1 year
Measurement speed	1 PLC (power line cycle)

Maximum voltage and current

	Max voltage	Max current
DC or pulsed ¹	210 V	0.105 A
	21 V	1.515 A ²
	6 V	3.03 A ²
Pulsed only ¹	200 V	1.515 A
	6 V	10.5 A

- See "Maximum pulse width and duty cycle" in Pulse Source Supplemental Characteristics for applicable maximum voltage and current. Pulse mode is not available for B2901BL/B2910BL SMUs.
- Max current limitation. For 21 V/1.515 A and 6 V/3.03 A ranges, total max current is limited by the table below for using 2 channels. Max current is not limited for using 1 channel only.



Maximum current limitation

Ch 1 voltage	Ch 2 voltage	Max total current limitation of Ch 1 and Ch 2
± (0 V < V ≤ 6 V)	± (0 V < V ≤ 6 V)	Ch 1 current + Ch 2 current ≤ 4 A
± (0 V < V ≤ 6 V)	± (6 V < V ≤ 21 V)	Ch 1 current + Ch 2 current x 1.6 ≤ 4 A
± (6 V < V ≤ 21 V)	± (0 V < V ≤ 6 V)	Ch 1 current + Ch 2 current x 0.625 ≤ 2.5 A
± (6 V < V ≤ 21 V)	± (6 V < V ≤ 21 V)	Ch 1 current + Ch 2 current ≤ 2.5 A

Voltage source specifications

Range	Programming resolution				Accuracy (% reading + offset)	Noise (peak to peak) 0.1 Hz to 10 Hz ¹	Max voltage (over range)
	B2901BL	B2910BL	B2901B/ B2902B	B2911B/ B2912B			
±200 mV	1 µV	1 µV	1 µV	100 nV	± (0.015 % + 225 µV)	≤ 10 µV	± 210 mV
±2 V	10 µV	10 µV	10 µV	1 µV	± (0.02 % + 350 µV)	≤ 20 µV	± 2.1 V
±20 V	100 µV	100 µV	100 µV	10 µV	± (0.015 % + 5 mV)	≤ 200 µV	± 21 V
±200 V ²	—	1 mV	1 mV	100 µV	± (0.015 % + 50 mV)	≤ 2 mV	± 210 V

1. Supplemental characteristics.
2. 200 V range is not available for B2901BL.

Current source specifications

Range	Programming resolution				Accuracy (% reading + offset)	Noise (peak to peak) 0.1 Hz to 10 Hz ¹	Max voltage (over range)
	B2901BL	B2910BL	B2901B/ B2902B	B2911B/ B2912B			
±10 nA ²	—	100 fA	—	10 fA	± (0.10 % + 50 pA)	≤ 1 pA	± 10.5 nA
±100 nA ³	—	1 pA	1 pA	100 fA	± (0.06 % + 100 pA)	≤ 2 pA	± 105 nA
±1 µA	10 pA	10 pA	10 pA	1 pA	± (0.025 % + 500 pA)	≤ 25 pA	± 1.05 µA
±10 µA	100 pA	100 pA	100 pA	10 pA	± (0.025 % + 1.5 nA)	≤ 60 pA	± 10.5 µA
±100 µA	1 nA	1 nA	1 nA	100 pA	± (0.02 % + 25 nA)	≤ 2 nA	± 105 µA
±1 mA	10 nA	10 nA	10 nA	1 nA	± (0.02 % + 200 nA)	≤ 6 nA	± 1.05 mA
±10 mA	100 nA	100 nA	100 nA	10 nA	± (0.02 % + 2.5 µA)	≤ 200 nA	± 10.5 mA
±100 mA	1 µA	1 µA	1 µA	100 nA	± (0.02 % + 20 µA)	≤ 600 nA	± 105 mA
±1 A	10 µA	10 µA	10 µA	1 µA	± (0.03 % + 1.5 mA)	≤ 70 µA	± 1.05 A
±1.5 A	10 µA	10 µA	10 µA	1 µA	± (0.05 % + 3.5 mA)	≤ 100 µA	± 1.515 A
±3 A ⁴	—	—	100 µA	10 µA	± (0.4 % + 7 mA)	≤ 120 µA	± 3.03 A
±10 A ^{4,5}	—	—	100 µA	10 µA	± (0.4 % + 25 mA) ⁶	—	± 10.5 A

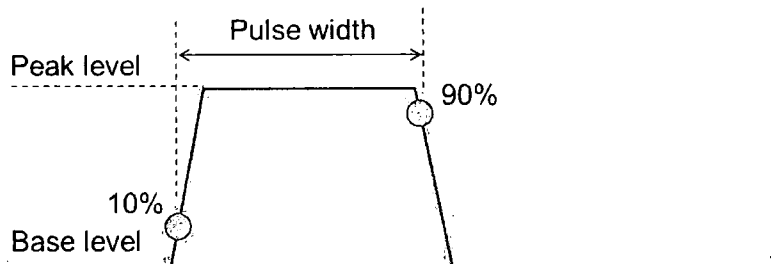
1. Supplemental characteristics.
2. 10 nA range is not available for B2901BL/B2901B/B2902B.
3. 100 nA range is not available for B2901BL.
4. 3A-10A ranges are not available for B2901BL/B2910BL.
5. 10 A range is available only for pulse mode; not available for DC mode.
6. Measurement speed: 0.01 PLC.

Source supplemental characteristics

Temperature coefficient (0 to 18°C and 28 to 50°C)		$\pm (0.1 \times \text{accuracy})/^{\circ}\text{C}$
Max output power and source/sink limits	B2901BL	31.8 W $\pm 6 \text{ V} @ \pm 1.515 \text{ A}, \pm 21 \text{ V} @ \pm 1.515 \text{ A}$, four quadrant source or sink operation
	B2910BL	31.8 W $\pm 6 \text{ V} @ \pm 1.515 \text{ A}, \pm 21 \text{ V} @ \pm 1.515 \text{ A}, \pm 210 \text{ V} @ \pm 105 \text{ mA}$, four quadrant source or sink operation
	Other models	31.8 W $\pm 6 \text{ V} @ \pm 3.03 \text{ A}, \pm 21 \text{ V} @ \pm 1.515 \text{ A}, \pm 210 \text{ V} @ \pm 105 \text{ mA}$, four quadrant source or sink operation
Current limit/compliance	Accuracy is same as current source. Minimum value is 1 % of range, or 1 nA in 10 nA range.	
Voltage limit/compliance	Accuracy is same as voltage source. Minimum value is 1 % of range, or 20 mV in 200 mV range	
Over range	101 % of source range for 1.5 A and 3 A ranges. 105 % of source range other than 1.5 A and 3 A ranges. No over range for 200 V range with current exceeding 105 mA pulse only condition.	
Voltage output settling time	Time required to reach within 0.1 % of final value at open load condition. Step is 10 % to 90 % range	
	200 mV, 2 V ranges	< 50 μs
	20 V range	< 110 μs
	200 V range	< 700 μs
Slew rate	$\leq 0.36 \text{ V}/\mu\text{s}$, 20 V and 10 mA ranges, 10 M Ω load resistance	
Over temperature protection	Output turns off then resets at over temperature sensed internally	
Current output settling time	Time required to reach within 0.1 % (0.3 % for 3 A range) of final value at short condition. Step is 10 % to 90 % range	
	10 nA, 100 nA ranges	< 10 ms
	1 μA range	< 500 μs
	10 μA , 100 μA ranges	< 250 μs
	1 mA to 3 A ranges	< 80 μs
Noise 10 Hz to 20 MHz (V source)	3 mVrms, 20 V range	
V source overshoot	< $\pm (0.1 \% + 10 \text{ mV})$. Step is 10 % to 90 % range, resistive load	
I source overshoot	< $\pm 0.1 \% (< \pm 0.3 \% \text{ for } 3 \text{ A range})$. Step is 10 % to 90 % range, resistive load	
Voltage source range change overshoot	$\leq 250 \text{ mV}$. 100 k Ω load, 20 MHz bandwidth	
Current source range change overshoot	$\leq 250 \text{ mV}/\text{R load}$, 20 MHz bandwidth	

Pulse source supplemental characteristics

Minimum programmable pulse width	50 μ s
Pulse width programming resolution	1 μ s
Pulse width definition	The time from 10 % leading to 90 % trailing edge as follows



	Pulsed					DC	
	Max voltage	Max peak current	Max base current	Pulse width	Max duty cycle	Max voltage	Max current
DC or pulsed	210 V	0.105 A	0.105 A	50 μ s to 99999.9 s	99.9999 %	210 V	0.105 A
	21 V	1.515 A ¹	1.515 A ¹	50 μ s to 99999.9 s	99.9999 %	21 V	1.515 A ¹
	6 V	3.03A ¹	3.03 A ¹	50 μ s to 99999.9 s	99.9999 %	6 V	3.03 A ¹
Pulsed only	200 V	1.515A	50 mA	50 μ s to 2.5 ms	2.5 %		
	180 V	1.05 A	50 mA	50 μ s to 10 ms	2.5 %		
	6 V	5.25 A	0.1 A	50 μ s to 3 ms	3.0 %		
	6 V	10.5 A	0.5 A	50 μ s to 1 ms	2.5 %		

1. Max current limitation For 21 V/1.515 A and 6 V/3.03 A ranges, total max current is limited by the table in page 13 for using 2 channels. Max current is not limited for using 1 channel only.

Minimum pulse width at the given voltage, current and settling conditions

Source value	Limit value	Load	Source settling (% of range)	Min pulse width
200 V	1.5 A	200 Ω	0.1%	1 ms
6 V	10.5 A	0.6 Ω	0.1%	0.2 ms
1.5 A	200 V	65 Ω	0.1%	2.5 ms
10.5 A	6 V	0.5 Ω	0.1%	0.2 ms
10.5 A ¹	6 V ¹	0.1 Ω ¹	0.1% ¹	0.1 ms ¹

1. Transient speed mode is set to FAST

Voltage measurement specifications

Range	Measurement resolution				Accuracy (% reading + offset)
	B2901BL	B2910BL	B2901B/ B2902B	B2911B/ B2912B	
±200 mV	100 nV	100 nV	100 nV	100 nV	± (0.015 % + 225 µV)
±2 V	1 µV	1 µV	1 µV	1 µV	± (0.02 % + 350 µV)
±20 V	10 µV	10 µV	10 µV	10 µV	± (0.015 % + 5 mV)
±200 V ¹	—	100 µV	100 µV	100 µV	± (0.015 % + 50 mV)

1 200 V range is not available for B2901BL

Current measurement specifications

Range	Measurement resolution				Accuracy (% reading + offset)
	B2901BL	B2910BL	B2901B/ B2902B	B2911B/ B2912B	
±10 nA ¹	—	10 fA	—	10 fA	± (0.10 % + 50 pA)
±100 nA ²	—	100 fA	100 fA	100 fA	± (0.06 % + 100 pA)
±1 µA	1 pA	1 pA	1 pA	1 pA	± (0.025 % + 500 pA)
±10 µA	10 pA	10 pA	10 pA	10 pA	± (0.025 % + 1.5 nA)
±100 µA	100 pA	100 pA	100 pA	100 pA	± (0.02 % + 25 nA)
±1 mA	1 nA	1 nA	1 nA	1 nA	± (0.02 % + 200 nA)
±10 mA	10 nA	10 nA	10 nA	10 nA	± (0.02 % + 2.5 µA)
±100 mA	100 nA	100 nA	100 nA	100 nA	± (0.02 % + 20 µA)
±1 A	1 µA	1 µA	1 µA	1 µA	± (0.03 % + 1.5 mA)
±1.5 A	1 µA	1 µA	1 µA	1 µA	± (0.05 % + 3.5 mA)
±3 A ³	—	—	10 µA	10 µA	± (0.4 % + 7 mA)
±10 A ^{3,4}	—	—	10 µA	10 µA	± (0.4 % + 25 mA) ⁵

1 10 nA range is not available for B2901BL/B2901B/B2902B.

2 100 nA range is not available for B2901BL.

3 3 A, 10 A ranges are not available for B2901BL/B2910BL.

4 10 A range is available only for pulse mode, not available for DC mode.

5 Measurement speed 0.01 PLC.

Measurement supplemental characteristics

Temperature coefficient (0 to 18 °C and 28 to 50 °C)	± (0.1 x accuracy)/°C
Over range	102 % of measurement range for 1.5 A and 3 A ranges 106 % of measurement range other than 1.5 A and 3 A ranges
Voltage measurement range change overshoot	< 250 mV, 100 kΩ load, 20 MHz bandwidth
Current measurement range change overshoot	< 250 mV/R load, 20 MHz bandwidth
Derating accuracy for measurement speed less than 1 PLC	Add % of range using the following table for measurement with PLC < 1

Derating accuracy with PLC setting < 1 PLC

	Voltage range		Current range			
	0.2 V	2 V to 200 V	10 nA	100 nA	1 µA to 100 mA	1 A to 3 A
0.1 PLC	0.01%	0.01%	0.1%	0.01%	0.01%	0.01%
0.01 PLC	0.05%	0.02%	1%	0.1%	0.05%	0.02%
0.001 PLC	0.5%	0.2%	5%	1%	0.5%	0.2%

Timer and triggering specification

Timer	Time stamp	TIMER value automatically saved when each measurement is triggered
	Trigger timing resolution	1 µs to 100 ms
	Accuracy	±50 ppm
	Arm/trigger delay	0 µs to 100,000 s
	Arm/trigger interval	B2901BL: 200 µs to 100,000 s B2910BL: 50 µs to 100,000 s B2901B/B2902B: 20 µs to 100,000 s B2911B/B2912B: 10 µs to 100,000 s
Triggering ¹	Arm/trigger event	B2901BL: 1 to 10,000 Other models: 1 to 100,000
	Digital I/O Trigger in to trigger out	≤ 5 µs
	Digital I/O Trigger in to source change	≤ 5 µs
	LXI Trigger in to source change	Minimum 100 µs, Typical 200 µs, Maximum Unknown
	LXI Trigger in to measurement	Minimum 100 µs, Typical 200 µs, Maximum Unknown
	Internal event to external LXI trigger output	Minimum 100 µs, Typical 200 µs, Maximum Unknown
	LXI event send/receive latency	Unknown
	Minimum trigger interval	10 µs

1. Supplemental characteristics

Other supplemental characteristics

Output characteristics

Sensing Modes	2-wire or 4-wire (Remote-sensing) connections
Low terminal connection	Chassis grounded or floating
Output connectors	Banana jack. Triaxial connections are recommended for sourcing and measuring less than 1 nA. A banana jack to triaxial adapter is available for low current measurement.
Output location	Channel 1 at front, and channel 2 at rear
Maximum load	Normal mode: 0.01 μ F High Capacitance mode: 50 μ F
DC floating voltage	Max \pm 250 V DC between low force and chassis ground
Guard offset voltage (V source)	< 4 mV
Remote sense operation range	Max voltage between High Force and High Sense = 3 V Max voltage between Low Force and Low Sense = 3 V
Common mode isolation	> 1 G Ω , < 4500 pF
Maximum sense lead resistance	1 k Ω for rated accuracy
Sense input impedance	> 10 G Ω

High capacitance mode

The high capacitance mode permits the measurement of devices with capacitances greater than the normal mode maximum load value of 0.01 μ F. In high capacitance mode the maximum allowed value of the load capacitance is 50 μ F.

Voltage output settling time	Time required to reach within 0.1 % of final value with 4.7 μ F capacitive load on a fixed range at specified current range and limit value		
	200 mV, 2 V ranges	600 μ s, at 1 A limit	
	20 V range	1.5 ms, at 1 A limit	
	200 V range	20 ms, at 100 mA limit	
Current measurement settling time	Time required to reach within 0.1 % of final value after voltage source is stabilized on fixed range. Vout is 5 V unless noted.		
	1 μ A range	230 ms	
	10 μ A, 100 μ A ranges	23 ms	
	1 mA, 10 mA ranges	0.23 ms	
	100 mA to 3 A ranges	100 μ s	
Mode change delay	Delay into high cap mode	1 μ A range	230 ms
		10 μ A, 100 μ A ranges	23 ms
	1 mA to 3 A ranges	1 ms	
	Delay out of high cap mode	All ranges	10 ms
Noise 10 Hz to 20 MHz (20 V range)			4.5 mVrms
Voltage source range change overshoot (20 V range or below)			< 250 mV, 20 MHz bandwidth
High Capacitance mode working conditions	V/I mode	Voltage source mode only	
	Range	Current measurement range is limited to fixed range only. 10 nA and 100 nA ranges are not available.	

High capacitance mode

Current limit $\geq 1 \mu\text{A}$

Resistance measurement

Resistance measurement can be performed under either auto or manual test conditions. Auto resistance measurement is performed in current source and voltage measurement mode. The total auto resistance measurement error is shown in the table below. The total error of a manual resistance measurement can be calculated using the voltage and current accuracy information as shown below.

Source I mode, manual ohm measurement (4-wire) Total error = $V_{\text{meas}}/I_{\text{src}} = R \text{ reading} \times (\text{gain error \% of V range} + \text{gain error \% of I range} + \text{offset error of I range}/I_{\text{src}} \text{ value \%}) + (\text{offset error of V range}/I_{\text{src}} \text{ value})$

Source V mode, manual ohm measurement (4-wire) Total error = $V_{\text{src}}/I_{\text{meas}} = 1/[1/R \text{ reading} \times (\text{gain error \% of I range} + \text{gain error \% of V range} + \text{offset error of V range}/V_{\text{src}} \text{ value \%}) + (\text{offset error of I range}/V_{\text{src}} \text{ value})]$

Measurement speed 1 PLC

Applicable for temperature $23 \text{ }^\circ\text{C} \pm 5 \text{ }^\circ\text{C}$

Example of total error calculation I source value = 1 mA at 1 mA range

V measure range = 2 V range

Total error (% reading + offset) = $(0.02 \% + 0.02 \% + 200 \text{ nA}/1 \text{ mA}) + (350 \mu\text{V}/1 \text{ mA})$
= $0.06 \% + 0.35 \Omega$

Typical performance of auto resistance measurement (4-wire), 2 V range

Range	Resolution	Test current	Current range	Total error (% reading + offset)
2 Ω	1 $\mu\Omega$	1 A	1 A	0.2 % + 0.00035 Ω
20 Ω	10 $\mu\Omega$	100 mA	100 mA	0.06 % + 0.0035 Ω
200 Ω	100 $\mu\Omega$	10 mA	10 mA	0.065 % + 0.035 Ω
2 k Ω	1 m Ω	1 mA	1 mA	0.06 % + 0.35 Ω
20 k Ω	10 m Ω	100 μA	100 μA	0.065 % + 3.5 Ω
200 k Ω	100 m Ω	10 μA	10 μA	0.06 % + 35 Ω
2 M Ω	1 Ω	1 μA	1 μA	0.095 % + 350 Ω
20 M Ω ¹	10 Ω	100 nA	100 nA	0.18 % + 3.5 k Ω
200 M Ω ¹	100 Ω	10 nA	100 nA	1.08 % + 35 k Ω

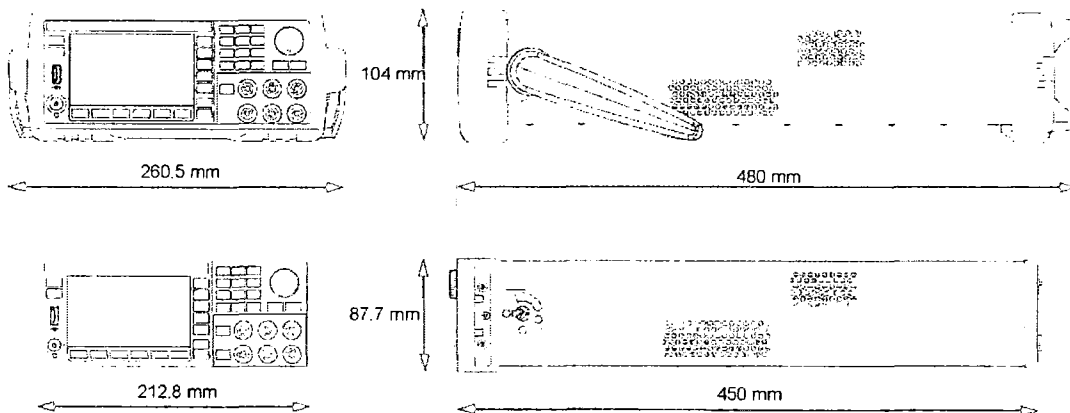
1. 20 M Ω 200 M Ω ranges are not available for B2901BL.

System speeds: Maximum sweep operation reading rates (reading/second) for 50 kHz				
Measure speed	Measure to memory	Measure to GPIB	Source measure to memory	Source measure to GPIB
< 0.001 PLC	20000	12500	19500	12500
0.01 PLC	4500	3950	4500	3950
0.1 PLC	500	490	500	490
1 PLC	49	49	49	49

Operation reading rate varies by number of sweep steps. Number of sweep steps is specified.

Environmental specifications

Environment		For use in indoor facilities
Operating		0 °C to +55 °C, 30 % to 80 % non-condensing
Storage		-30 °C to 70 °C, 10 % to 90 % non-condensing
Altitude		Operating: 0 m to 2000 m, Storage: 0 m to 4600 m
Power supply		90 V to 264 V, 47 Hz to 63 Hz, 250 VA maximum
Overvoltage category		II
Pollution degree		2
EMC		IEC61326-1/EN61326-1, AS/NZS CISPR 11, KC: RRA Notification amending Radio Waves Act Article 58-2
Safety		IEC61010-1/EN61010-1, CAN/CSA-C22.2 No. 61010-1, C/US
Certifications		CE, cCSAus, RCM, KC
Warm-up		1 hour
Dimensions	Case	88 mm (2U) x 213 mm (half width) x 450 mm
	Working	180 mm x 260 mm x 480 mm (with handle and feet)
Weight	Net	6.0 kg (B2901BL, B2910BL, B2901B, B2911B), 7.4 kg (B2902B, B2912B)
	Shipping	9.5 kg (B2901BL, B2910BL, B2901B, B2911B), 11.0 kg (B2902B, B2912B)



Front panel operation

Front panel interface	4.3" TFT color display (480 x 272, with LED backlight) with keypads and rotary knob
View mode	Single view, Dual view, Graph view and Roll view
Hard keys	Single Trigger and Auto Trigger control, 10-key, Rotary Knob and Cursors, Channel on/off, View, Cancel/Local
Softkeys	Function, System and Input Assist Keys
Indicators	Channel (measurement) status, System status

Source/measurement capabilities

Sweep measurement

Number of steps	B2901BL: 1 to 10,000 Other models: 1 to 100,000
Sweep mode	Linear, logarithmic (log) or list
Sweep direction	Single or double
Type	DC, or pulse
Min programmable value to create list sweep waveform	B2901BL: Min 200 μ s with 1 μ s resolution B2910BL: Min 50 μ s with 1 μ s resolution B2901B/B2902B: Min 20 μ s with 1 μ s resolution B2911B/B2912B: Min 10 μ s with 1 μ s resolution

Digitizing/sampling measurement

Min trigger interval (Max speed of measurement)	B2901BL: 200 μ s (5,000 points/s) B2910BL: 50 μ s (20,000 points/s) B2901B/B2902B: 20 μ s (50,000 points/s) B2911B/B2912B: 10 μ s (100,000 points/s)
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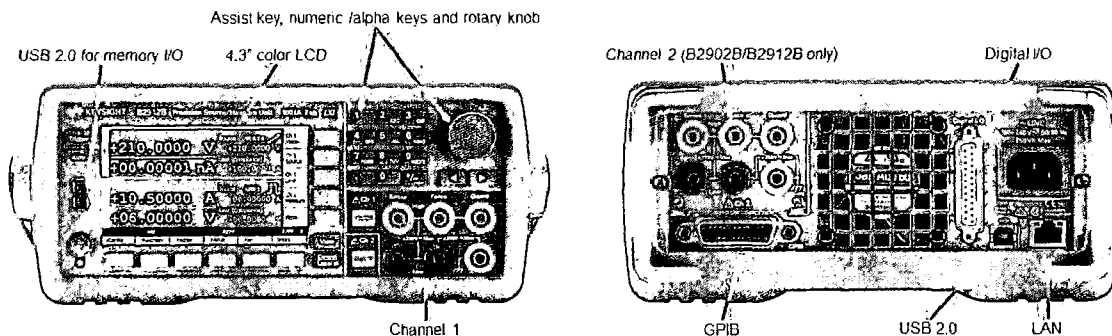
Data buffers

Max buffer size	B2901BL: 10,000 points/channel Other models: 100,000 points/channel
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Input/output connectivity

GP-IB		IEEE-488.2
Ethernet		100BASE-T/10BASE-T
USB		USB 2.0 host controller (front) USB 2.0 device interface (rear)
Digital I/O	Connector type	25-pin female D
	Input/output pins	14 open drain I/O bits
	Absolute max input voltage	5.25 V
	Absolute min input voltage	-0.25 V
	Max logic L input voltage	0.8 V
	Min logic H input voltage	2.0 V
	Max source current	1 mA @ Vout = 0 V
	Max sink current	50 mA @ Vout = 5 V
	5 V power supply pin	Limited to 500 mA, solid state fuse protected
	Safety interlock pin	One active high pin and one active low pin. Activation of both pins enables output voltage > 42 V
	Maximum number of simultaneously triggered units (using Digital I/O) ¹	8

1 Supplemental characteristics.



Program, software and drivers

Programming	SCPI
Program memory	100 kB (2500 lines typical)
LXI compliance	LXI Core 2011
Software available	EasyEXPERT group+, Quick I/V Measurement Software, Graphical Web Interface, PathWave BenchVue
Drivers available	IVI-C, IVI-COM drivers, LabVIEW drivers

Software prerequisites		
EasyEXPERTgroup+	Operating system	Microsoft Windows 8.1 Professional or later (32bit/64bit), Microsoft Windows 10 Pro or later (32bit/64bit)
	Supporting language	English (US)
	.NET Framework	Microsoft .NET, Framework 3.5 SP1
	IO Libraries	Keysight IO Libraries Suite 17.1 update 1 or later (for the Online execution mode)
	Memory	2 GB memory
	Display	XGA 1024 x 768 (SXGA 1280 x 1024 recommended)
	HDD	Installation: 1GB free disk space on the C drive, Test setup/result data storage: Free disk space more than 30GB is recommended
	Recommended GPIB I/F	Keysight 82350B/C (PCI) ¹ , 82351B(PCIe) ¹ 82357A (USB) ^{2,3} , 82357B (USB) ^{2,3} National Instrument: GPIB-USB-HS (USB) ^{1,2}
Quick IV	Operating system	Windows 8 (32 bit/64 bit), Windows 8.1 (32 bit/64 bit), Windows 10 (32 bit/64 bit)
	Supporting language	English (US)
	.NET Framework	Microsoft .NET, Framework 4.5.2
	IO Libraries	17.0 or later
	Interfaces	USB, GP-IB, LAN
PathWave BenchVue	Operating system	Windows 10 32-bit and 64-bit (Professional, Enterprise, Education, Home versions) Windows 8 32-bit and 64-bit (Professional, Enterprise, Core)
	CPU	1 GHz or faster (2 GHz or greater recommended)
	RAM	1 GB (32-bit) or 2 GB (64-bit) (3 GB or greater recommended)
	Display resolution	1024 x 768 minimum for single instrument view (higher resolutions are recommended for multiple instrument view)
	Interfaces	USB, GPIB, LAN, RS-232

1. A PCI or PCIe card is highly recommended because of stability and speed.
2. USB GPIB interfaces might cause serial poll error intermittently due to the intrinsic communication scheme differences. It is reported that using an even GPIB address sometimes significantly decreases the chance of the error. The NI GPIB-USB-HS is recommended for stability, and the Keysight 82357x is recommended for speed.
3. EasyEXPERT software prohibits to set the odd GPIB address to prevent the issue above.

Furnished Accessories

Power cable, USB cable, Quick Reference (English)

Ordering Information

Model number	
B2901BL	Precision Source/Measure Unit, 1 ch, 1 pA resolution, 21 V, 1.5 A
B2910BL	Precision Source/Measure Unit, 1 ch, 10 fA resolution, 210 V, 1.5 A
B2901B	Precision Source/Measure Unit, 1 ch, 100 fA, 210 V, 3 A DC/10.5 A pulse
B2902B	Precision Source/Measure Unit, 2 ch, 100 fA, 210 V, 3 A DC/10.5 A pulse
B2911B	Precision Source/Measure Unit, 1 ch, 10 fA, 210 V, 3 A DC/10.5 A pulse
B2912B	Precision Source/Measure Unit, 2 ch, 10 fA, 210 V, 3 A DC/10.5 A pulse

Options	
1A7	Calibration + Uncertainties + Guardbanding (Not Accredited)
A6J	ANSI Z540-1-1994 Calibration
UK6	Commercial Calibration Certificate with Test Data

Accessories	
N1297A	Banana - Triax adapter for 2-wire (non-Kelvin) connection
N1297B	Banana - Triax adapter for 4-wire (Kelvin) connection
N1294A-011	Interlock cable for 16442B (1.5 m)
N1294A-012	Interlock cable for 16442B (3.0 m)
N1294A-031	GPIO-BNC trigger adapter
N1294A-032	Digital I/O trigger cable for multiple unit control
16494A-001	Low leakage triax cable (1.5 m)
16494A-002	Low leakage triax cable (3.0 m)
16494A-005	Low leakage triax cable (4.0 m)
1CM124A	Rack mount flange kit

Upgrade kit	
B2901BLU	B2901BL Software Upgrade Package, Extension Support and Subscription
B2910BLU	B2910BL Software Upgrade Package, Extension Support and Subscription
B2901BU	B2901B Software Upgrade Package, Extension Support and Subscription
B2902BU	B2902B Software Upgrade Package, Extension Support and Subscription
B2911BU	B2911B Software Upgrade Package, Extension Support and Subscription
B2912BU	B2912B Software Upgrade Package, Extension Support and Subscription

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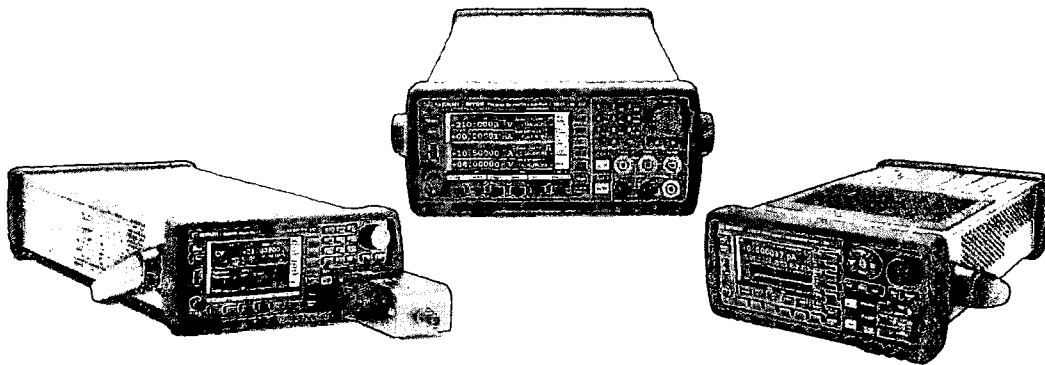


Accessories for the B2900 Precision Instrument Family

Keysight B2900B/BL Series Precision Source/Measure Units

Keysight B2960B Series 6.5 digit Low Noise Power Sources

Keysight B2980B Series Femto/Picoammeters & Electrometers Narrow



This accessory catalog introduces all of the accessories available for use with the Keysight B2900 Precision Instrument Family

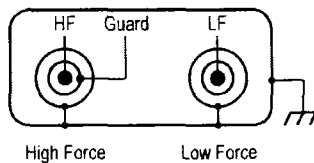
Interface Adapters and Noise Filters

Short description	Model	Additional information
Banana - Triax Adapter	N1297A	For 2-wire (non Kelvin) connection
Banana - Triax Adapter	N1297B	For 4-wire (Kelvin) connection
High Current Ultra Low Noise Filter	N1298A	High Current Ultra Low Noise Filter (21V/500mA, 10Ohm) for B2961/62B.
Ultra Low Noise Filter	N1298B	Ultra Low Noise Filter (42V/105mA, 50Ohm) for B2961/62B
Low Noise Filter	N1298C	Low Noise Filter (210V/3A) for B2961/62B

N1297A Banana - Triax Adapter for 2-wire (non Kelvin) connection:



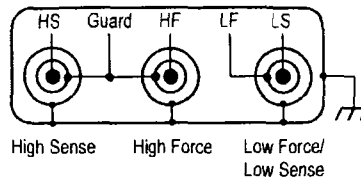
This adapter converts the 6P banana outputs to two triax connector outputs. It is available for the B2901/10BL, B2901/02/11/12B and the B2961/62B..



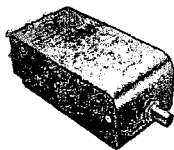
N1297B Banana - Triax Adapter for 4-wire (Kelvin) connection:



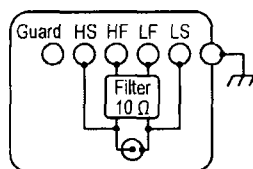
This adapter converts the 6P banana outputs to three triax connectors. It is available for the B2901/10BL, B2901/02/11/12B and the B2961/62B..



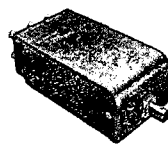
N1298A High Current Ultra Low Noise Filter (21V/500 mA, 10 Ω) for B2961/62B:



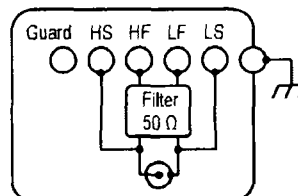
This adapter converts 6P banana outputs to one BNC connector outputs with the ultra low noise filtering capability. It can be used with the B2961/62B..



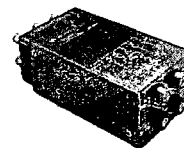
N1298B Ultra Low Noise Filter (42V/105mA, 50 Ω) for B2961/62B:



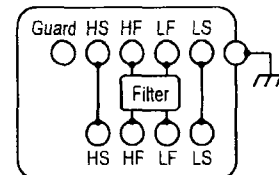
This adapter converts 6P banana outputs to one BNC connector outputs with the ultra low noise filtering capability. It can be used with the B2961/62B..



N1298C Low Noise Filter (210V/3A) for B2961/62B:



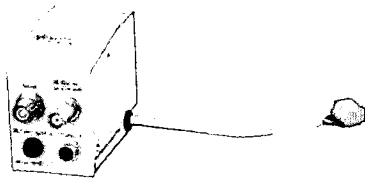
This adapter converts 6P banana outputs to 4P banana outputs with the low noise filtering capability. It can be used with the B2961/62B..



Adapters for Resistance Measurement

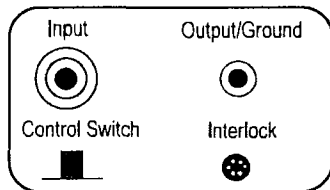
Short description	Model	Additional information
GPIO-BNC Trigger Adapter	N1294A-031	
Digital I/O Trigger Cable for Multiple Unit Control	N1294A-032	Required to use the multiple units of the B2901/10BL, B2901/02/11/12B with EasyEXPERT group+ software
High Resistance Meter Fixture Adapter	N1413A	Adapter to enable to use the N1424A/B/C, N1425A/B, N1427A/B and N1428A with the B2985/87B for resistance measurement
High Resistance Measurement Universal Adapter	N1414A	For resistance measurement using the B2985/87B

N1413A High Resistance Meter Fixture Adapter for B2985/87B:



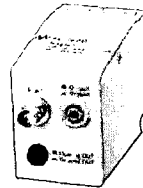
This adapter enables to use the N1424A/B/C, N1425A/B, N1427A/B and N1428A with the B2985/87B.

In addition, by using this adapter, sourced voltage can be monitored by the Voltmeter in the B2985/87B without changing connection.



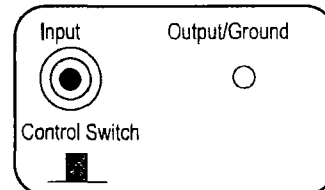
Input: Triaxial (special screw-type) Output/Ground *: High Voltage BNC (special type) Interlock: 6 pin mini plug interlock connector
Note: please refer to User's Guide for Keysight B2980B Series Femto/Picoam-meter & Electrometer for the details.

N1414A High Resistance Measurement Universal Adapter for B2985/87B:



This adapter simplifies the cabling when making resistance measurement with the B2985/87B.

In addition, by using this adapter, sourced voltage can be monitored by the Voltmeter in the B2985/87B without changing connection.

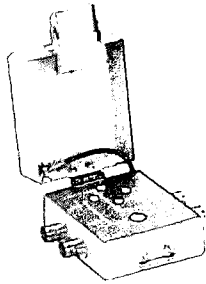


Input: Triaxial
Output/Ground *: Banana connector
Note: please refer to User's Guide for Keysight B2980B Series Femto/Picoam-meter & Electrometer for the details.

Test Fixtures

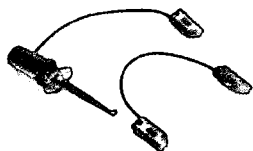
Short description	Model	Additional information
Device/Component Test Fixture	N1295A	Test Fixture with 4 Triax Connectors for Keysight B2900B/BL Series
Test Fixture	16442B	Test Fixture for E5270 and general use
Resistivity Cell	N1424A	For N1413 with B2980 Series(50 mm Electrodes)
	N1424B	For N1413 with B2980 Series(26/50 mm Diameter Electrodes)
	N1424C	For N1413 with B2980 Series (26/50/76 mm Diameter Electrodes)
Component Test Fixture	N1428A	For N1413 with B2980 Series

N1295A Device/Component Test Fixture with 4 Triax Connectors for Keysight B2900B/BL Series:

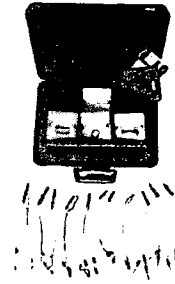
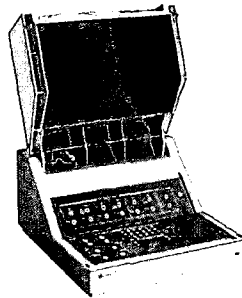


This test fixture has four triaxial connectors, allowing it to make two 2-wire connections or 4-wire connections. The N1295A test fixture supports up to 42 V and 1.05 A DC. It is compatible with the B2901/10BL, B2901/02/11/12B and B2961/62B. The N1295A comes with the following accessories:

- Pin plug to miniature clip wire (4 pcs)
- Pin plug to pin plug wire (2 pcs)



16442B Test Fixture:

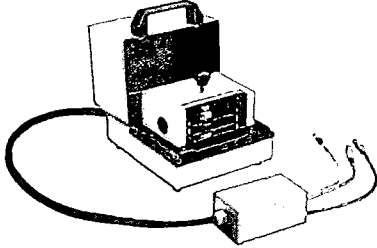


The 16442B Test Fixture can also be used with the B2900B/BL Series Precision Instruments. The 16442B Test Fixture has 6 triaxial connectors and 6 BNC coaxial connectors for interfacing with the B2900B/BL Series Precision Instruments. The triaxial connectors of the 16442B support up to 200 V and 1 A DC. It is compatible with the B2901/10BL, B2901/02/11/12B and B2961/62B. The 16442B comes with the following accessories:

- Blank PTFE board
- 28-pin dual-in-package (DIP) socket module
- 0.075-inch universal socket module
- 0.5-inch universal socket module
- Miniature banana to pin plug cables, black (4 pcs), red (4 pcs), blue (4 pcs)
- Pin plug to pin plug cables, black (3 pcs), red (3 pcs), blue (3 pcs)
- Miniature banana to miniature clip cables, black (3 pcs), red (3 pcs), blue (3 pcs) -
- Miniature banana to miniature banana, black (3 pcs), red (3 pcs), blue (3 pcs) -
- Connection pin set (10 ea)
- Accessory case

These accessories give the 16442B Test Fixture the ability to support a wide range of measurement applications. Note: Please refer to User's Guide for Keysight 16442B Test Fixture for the details.

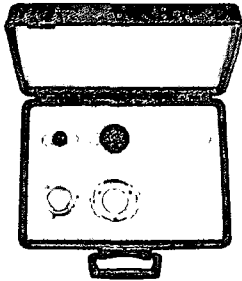
N1424A/B/C Resistivity Cell:



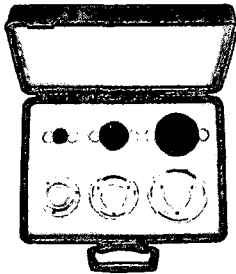
This N1424A/B/C resistivity cell can be used with the B2985/87B to measure surface or volume resistivity of insulation materials. Three kinds of electrodes (diameter: 26 mm/50 mm/76 mm) are available to meet various insulation measurement standards such as ASTM D-257.

The N1413A adapter is required to use the N1424A/B/C resistivity cell with the B2985/87B.

The 50 mm diameter electrode is furnished with the N1424A. The 26 mm/50 mm diameter electrodes are furnished with the N1424B

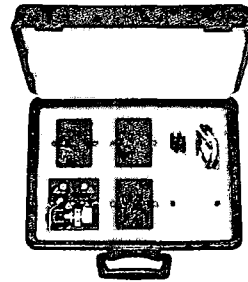
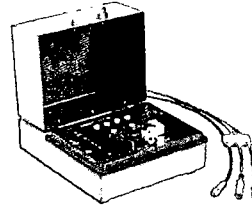


The 26 mm/50 mm/76 mm diameter electrodes in the carrying case are furnished with the N1424C



Note: Please refer to User's Guide for Accessories for Keysight B2985B/B2987B for the details.

N1428A Component Test Fixture:



This N1428A component test fixture can be used with the B2985/87B to measure SMD, lead and various type of devices. The N1413A adapter is required to use the N1428A component test fixture with the B2985/87B.

The N1428A comes with the following accessories:

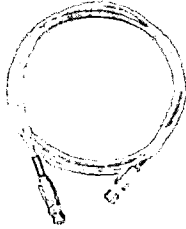
- SMD module
- Flat table
- Miniature Banana-plug cable (2 pcs)
- 100 k Ω output resistor
- 1 M Ω output resistor
- 10 M Ω output resistor
- 100 M Ω output resistor
- Alligator clip (2 pcs)
- Carrying case

Note: Please refer to User's Guide for Accessories for Keysight B2985B/B2987B for the details.

Signal Cables

Short description	Model	Additional information
Triax cable	16494A-001	Low leakage Triax cable (200 V, 1.5 m)
	16494A-002	Low leakage Triax cable (200 V, 3.0 m)
	16494A-003	Low leakage Triax cable (200 V, 0.8 m)
	16494A-004	Low leakage Triax cable (200 V, 0.4 m)
	16494A-005	Low leakage Triax cable (200 V, 4.0 m)
High Current Triax cable	16493L-001	Triax cable for current higher than 1 A (1.5 m) [Ground Unit cable for B1500/E5260/E5270/41501 (Triax, 1.5 m)]
	16493L-002	Triax cable for current higher than 1 A (3.0 m) [Ground Unit cable for B1500/E5260/E5270/41501 (Triax, 3.0 m)]
High Voltage Triax cable	N1412A	Low leakage Triax cable (500 V, 1.5 m)
	N1412B	Low leakage Triax cable (500 V, 3.0 m)
	N1412C	Low leakage Triax cable (500 V, 6.0 m)
Coax cable	16493B-001	Coax cable (1.5 m)
	16493B-002	Coax cable (3.0 m)
High Current Coax cable	16493U-001	High Current BNC Coax cable (1.5 m)
	16493U-002	High Current BNC Coax cable (3.0 m)
BNC cable	U2921A-100	Coaxial BNC cable (1.2 m)
High Voltage Test leads	U8201-60001	High voltage test leads (1.3 m) , black (1 pcs) , red (1 pcs)
Triax to Alligator cable	N1415A	Triax to alligator cable (1.5 m)
Low Noise Test Leads	N1425A	For N1413 with B2980 series (1.5 m)
	N1425B	For N1413 with B2980 series (3.0 m)
Pin Probes	N1426A	Pin Probes for N1425
Soldering Sockets	N1426B	Soldering Sockets for N1425
Alligator Clips	N1426C	Alligator Clips for N1425
Low Noise Test Cables	N1427A	For N1413 with B2980 series (1.5 m)
	N1427B	For N1413 with B2980 series (3.0 m)

16494A Triaxial cable:

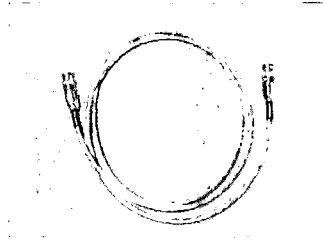


The 16494A Triaxial cable is suitable for low current applications down to the sub-fA level. It supports a maximum voltage/current of 200V/1A DC.

Cable length (options):

16494A-001: 1.5 m
16494A-002: 3.0 m
16494A-003: 0.8 m
16494A-004: 0.4 m
16494A-005: 4.0 m

16493L High Current Triaxial cable:



This cable can be used as a general purpose triaxial cable for high current applications up to 4.2 A DC and 200 V. It can also be used for low current applications down to the sub-pA level.

Cable length (options):

16493L-001: 1.5 m
16493L-002: 3.0 m

N1412A/B/C High Voltage Triaxial cable:



The N1412A/B/C Triaxial cable is suitable for low current applications down to the sub-fA level. It supports a maximum voltage/current of 500 V/1 A DC.

Cable length (options):

N1412A: 1.5 m
N1412B: 3.0 m
N1412C: 6.0 m

16493B Coaxial cable:

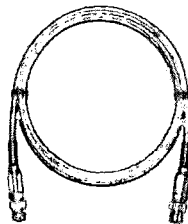


The 16493B Coaxial cable is suitable for general and low noise applications for up to 40 V and 200 mA

Cable length (options):

16493B-001: 1.5 m
16493B-002: 3.0 m

16493U High Current Coaxial cable:

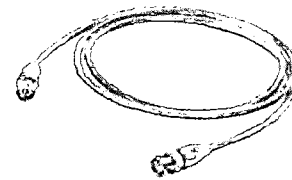


The 16493U High Current Coaxial cable is suitable for high current applications and it is compatible with the B2901/10BL, B2901/02/11/12B, B2961/62B, and B2981/83/85/87B. It supports up to 40 V and 20 A pulse.

Cable length (options):

16493U-001: 1.5 m
16493U-002: 3.0 m

U2921A-100 BNC cable:



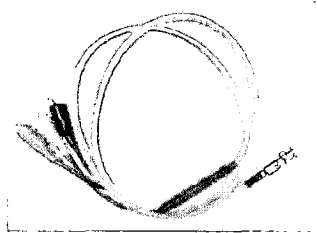
The U2921A-100 Coaxial BNC cable (1.2 m) is compatible with the B2901/10BL, B2901/02/11/12B, B2961/62B, and B2981/83/85/87B.

U8201-60001 High Voltage Test leads:



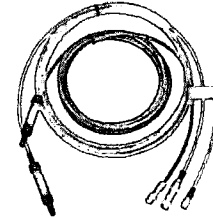
U8201-60001 includes one red and one black high voltage test lead with banana plug ends. These cables are included in the U8201A (see "Other accessories" on page 14) The leads are (approx.) 1.3 m and support CAT III 1000 V, 15A.

N1415A Triax to Alligator cable:



Triax cable terminated with a male triax connector on one end and three alligator clips on the other. It supports up to 200 V and 1A DC. It is compatible with the B2901/10BL, B2901/02/11/12B, B2961/62B, and B2981/83/85/87B. Note: Appropriate connections between the alligator clips, shielding box and DUT are required when performing sensitive low-level measurements.

N1425A/B Low Noise Test Leads:



N1425A/B is used to measure resistance with the B2985/87B. The N1413A and one of the N1426A/B/C are required to use the N1425A/B with the B2985/87B

Cable length (options):
N1425A: 1.5 m
N1425B: 3.0 m

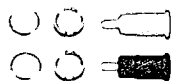
Note: Please refer to User's Guide for Accessories for Keysight B2985B/B2987B for the details.

N1426A Pin Probes:



Pin probes used with the N1425 for the B2985/87B

N1426B Soldering Sockets:



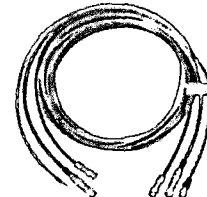
Soldering sockets used with the N1425 for the B2985/87B.

N1426C Alligator Clips:



Alligator clips used with the N1425 for the B2985/87B.

N1427A/B Low Noise Test Cables:



N1427A/B is used to measure resistance with the B2985/87B. The N1413A is required to use the N1427A/B with the B2985/87B.

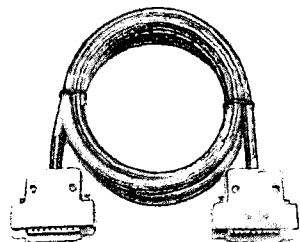
Cable length (options):
N1427A: 1.5 m
N1427B: 3.0 m

Note: Please refer to User's Guide for Accessories for Keysight B2985B/B2987B for the details.

Interface Cables

Short description	Model	Additional information
Digital I/O cable	16493G-001	For triggering use among the B2901/10BL, B2901/02/11/12B and the B2961/62B. (1.5 m)
	16493G-002	For triggering use among the B2901/10BL, B2901/02/11/12B and the B2961/62B. (3.0 m)
Digital I/O T-cable	N1253A-100	Digital I/O T-cable for triggering
RS-232 Cable Kit	34398A	RS-232 cable kit for Digital I/O of the B2980B Series for triggering
Interlock cable	N1294A-011	For 16442A/B test fixture (GPIO Dsub25 to 6pin mini plug, 1.5 m)
	N1294A-012	For 16442A/B test fixture (GPIO Dsub25 to 6pin mini plug, 3.0 m)
	N1411A	4 pin terminal plug to 6 pin circular plug (1.5 m)
	N1411B	4 pin terminal plug to 6 pin circular plug (3.0 m)
GPIB cable	10833A	GPIB cable (1.0 m)
	10833B	GPIB cable (2.0 m)
	10833C	GPIB cable (4.0 m)
	10833D	GPIB cable (0.5 m)
USB A-BI-O Cable	8121-1696	USB A-B I-O cable (2.0 m), 4COND LG PVC White
GPIO-BNC Trigger Adapter	N1294A-031	
Digital I/O Trigger Cable for Multiple Unit Control	N1294A-032	Required to use the multiple units of the B2901/10BL, B2901/02/11/12B with EasyEXPERT group+ software

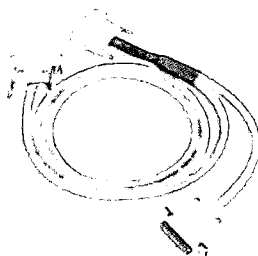
16493G Digital I/O cable:



The 16493G Digital I/O cable supports trigger signal distribution for the B2901/10BL, B2901/02/11/12B and the B2961B/62B.

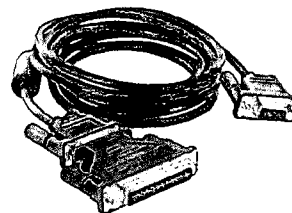
Cable length (options):
16493G-001: 1.5 m
16493G-002: 3.0 m

N1253A-100 Digital I/O cable:



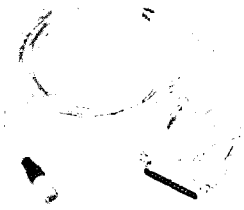
The N1253A-100 Digital I/O cable can distribute trigger signals for three units and it supports the B2901/10BL, B2901/02/11/12B and the B2961/62B. (male - male - female).

34398A RS-232 Cable Kit:



The 34398A is an RS-232 cable kit which includes a 9-pin (f) to 9-pin(f) RS-232 cable and a 9-pin (m) to 25-pin (f) adapter. It is compatible with the B2981/83/85/87B and supports trigger signal distribution for the B2981/83/85/87B, B2961B/62B and B2901/10BL, B2901/02/11/12B.

N1294A-011/012 Interlock cable for 16442B test fixture:



The interlock cable is used to connect between the 16442B test fixture and the instrument's GPIO Dsub25 connector. It is compatible with the B2901/10BL, B2901/02/11/12B and the B2961/62B..

Cable length (options):
 N1294A-011: 1.5 m
 N1294A-012: 3.0 m

N1411A/B Interlock cable:



N1411A/B is an interlock cable terminated with a 4-pin terminal plug on one end and 6-pin circular plug on the other. It is compatible with the B2981/83/85/87B.

Cable length (options):
 N1411A: 1.5 m
 N1411B: 3.0 m

10833A/B/C/D GPIB cable:



The Keysight 10833 GPIB cable is engineered for exceptional reliability and durability even under the harshest conditions.

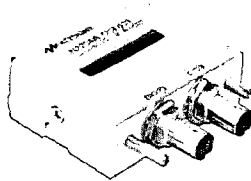
Cable length (options):
 10833A: 1.0 m
 10833B: 2.0 m
 10833C: 4.0 m
 10833D: 0.5 m

8121-1696 USB cable - 2 m:



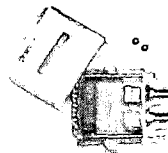
The USB cable is used to interface between a PC controller and the instrument.

N1294A-031 GPIO - BNC Trigger Adapter:

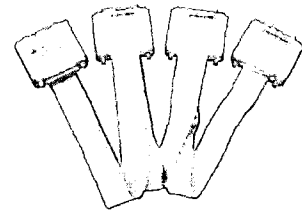


This adapter is used to route the triggering signals from the instrument's GPIO Dsub25 connector for two coax connectors. It is available for the B2901/10BL, B2901/02/11/12B and the B2961/62B..
 In addition, you can access any of the Digital I/O signal pins by soldering a wire to the corresponding Digital I/O path located on the adapter's internal printed circuit board.

Note: This requires opening the N1294A-031.



N1294A-032 Digital I/O Trigger Cable for Multiple Unit Control

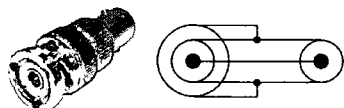


This adapter is required to use the multiple units of the B2901/10BL, B2901/02/11/12B with EasyEXPERT group+software. The adapter has 4 Dsub25 connectors, which enables you to connect up to 4 units of the B2901/10BL, B2901/02/11/12B and to control them through EasyEXPERT group+software.

Cable Adapters and Connectors

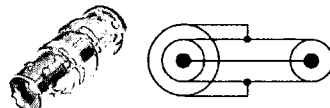
Short description	Model	Additional information
Triax(m) to BNC (f) adaptor	N1254A-101	Triax(male) to BNC (female) adaptor
Triax(f) to BNC (m) adaptor	N1254A-102	Triax(female) to BNC (male) adaptor
Triax(m) to BNC (f) adaptor	N1254A-103	Triax(male) to BNC (female) adaptor
Triax (f) to BNC (m) adaptor	N1254A-104	Triax (female) to BNC (male) adaptor
Triax (f) to BNC (m) adaptor	N1254A-105	Triax (female) to BNC (male) adaptor
Triax (m) to BNC (f) adaptor	N1254A-106	Triax (male) to BNC (female) adaptor
Triax (m) to Triax (f) adaptor	N1254A-107	Triax (male) to Triax (female) adaptor
Triax (f) to Triax (f) adaptor	1250-2618	Triax (female) to Triax (female) adapter feedthrough
Coax Tee Adapter (m-f-f)	1250-2405	Adapter-Coax Tee Male-BNC Female-BNC Female BNC
Triax Tee Adapter (f-m-f)	1250-1551	BNC Adapter-Coax Tee Female-Triax Male-Triax Female-Triax
Triax Bulkhead connector	N1416A	Triax bulkhead connector, 200V
	N1416B	Triax bulkhead connector, 500V
Open cap	N1417A	Open cap for Triax connector
Double Banana – BNC (f)	1251-2277	

N1254A-101 Triax (m) to BNC (f) adaptor:



Male triax to female BNC adapter (guard connected to the coax outer conductor). It supports up to 200 V.

N1254A-102 Triax (f) to BNC (m) adaptor:



Female triax to male BNC adapter (guard connected to the coax outer conductor). It supports up to 200 V.

N1254A-103 Triax (m) to BNC (f) adaptor:



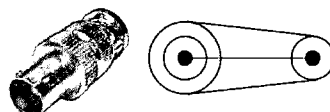
Male triax to female BNC adapter (guard connected to the coax outer conductor). It supports up to 200 V.

N1254A-104 Triax (f) to BNC (m) adaptor:



Female triax to male BNC adapter (guard connected to the coax outer conductor). It supports up to 200 V.

N1254A-105 Triax (f) to BNC (m) adaptor:



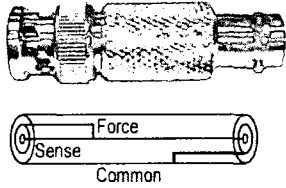
Female triax to male BNC adapter (guard is not connected to the BNC terminal). It supports up to 200 V.

N1254A-106 Triax (m) to BNC (f) adaptor:



Male triax to female BNC adapter (guard is not connected to the BNC terminal). It supports up to 200 V.

N1254A-107 Triax (m) to Triax (f) adaptor:



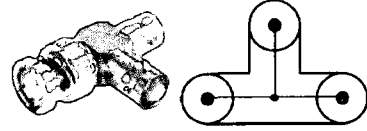
Female triax to male triax adapter. Male guard is connected to sense, and female guard is connected to the body. This adapter is used to convert the Low output of the N1297B Banana - Triax Adapter from Kelvin to non-Kelvin sensing.

1250-2618 Triax (f) to Triax (f) adapter:



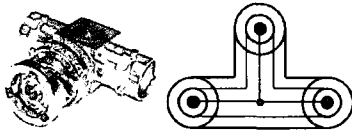
Female triax to female triax adapter for use with triax interconnect. It supports up to 200 V.

1250-2405 Coax Tee Adapter:



BNC tee adapter, male- female - female.

1250-1551 Triax Tee Adapter:



Triax tee adapter, male- female - female. It supports up to 200 V.

N1416A/B Triax bulkhead connector:



Triax bulk-head connector for soldered connections. N1416A and N1416B support a maximum voltage of 200 V and 500V, respectively.

N1417A Open Cap for Triax connector:



Protective shield/cap for Triax connector

1251-2277 Double Banana – BNC (f) :

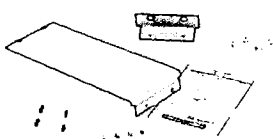


Dual Banana to BNC adapter for connecting instrument with dual banana jack

Rack Mount Kit

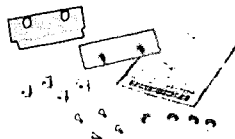
Short description	Model	Additional information
Rack mount kit	1CM124A	
Dual Flange Kit, 2U	1CM107A	
Dual Lock Link Kit	34194A	
Basic Rail kit	E3663AC	

1CM124A Rack mount kit:



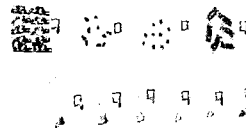
The 1CM124A Rack mount kit can rack mount a single B2900B/BL Series Precision Instrument in an Keysight rack.

1CM107A Dual Flange kit, 2U:



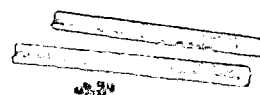
The 1CM107A is a 2U height rack mount flange kit.

34194A Dual Lock Link kit:



The 34194A Dual Lock Link kit is used with the 1CM107A to mount two Keysight System II (half-width, 2U height - 88.1 mm) instruments side-by-side.

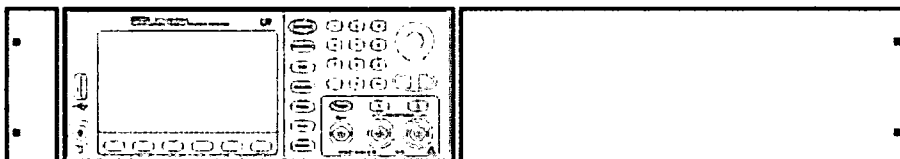
E3663AC Basic Rail kit:



The E3663AC System II rails support mounting Keysight System II instruments in an Keysight rack.

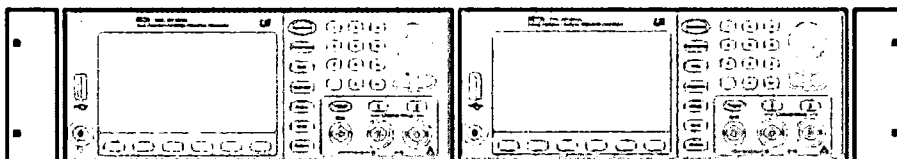
Rack mount image for single B2900B/BL Series Precision Instrument:

- 1 x B2900B/BL Series Precision Instrument
- 1CM124A Rack mount Kit.
- E3663AC Basic Rail kit



Rack mount image for double B2900B/BL Series Precision Instruments:

- 2 x B2900B/BL Series Precision Instruments
- 1CM107A Dual Flange kit, 2U
- 34194A Dual Lock Link kit
- E3663AC Basic Rail kit



Other Accessories

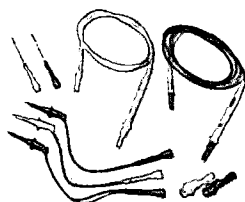
Short description	Model	Additional information
Combo test lead kit	U8201A	
Test lead kit	U8202A	Test lead kit, electronic
Kelvin probe set	11059A	Banana-Clip Kelvin probe set
BNC to 2 wires	U2941A-107	BNC to 2 wires - 1.0 m
Cable Plug-Plug	N1295-61701	
Cable Plug-Clip	N1295-61702	
Alligator clips	U3606-60030	Alligator clips, black (1pcs) , red (1 pcs)
Interlock cable adapter set	16435A	Interlock cable adapter to convert the N1294A-011's 6 pin connector to BNC
Lithium-ion battery pack	N1418A	Lithium-ion battery pack for the B2983B/87B
Thermocouple	N1423A	Thermocouple for the B2985/87B

U8201A Combo Test Lead kit:



The U8201A Combo Test Lead Kit includes a pair of test leads, test probes, alligator clips, SMT grabbers, fine-tip test probes, and banana plugs. Included test probe lead supports CAT III 1000 V, 15 A.

U8202A Test Lead kit:



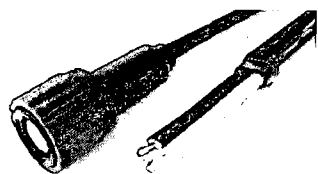
The U8202A Test Lead Kit includes a pair of test lead and probes, alligator clips, SMT grabbers, and fine-tip test probes. Included test lead & probe support CAT III 1000 V, 15 A.

11059A Kelvin Probe set:



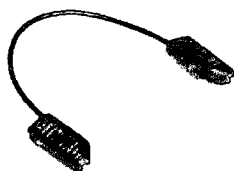
The 11059A Kelvin probe set consists of two flat tweezers, four banana jacks, and one ground guard connector. It supports maximum voltage of 42V.

U2941A-107 BNC to 2 wires:



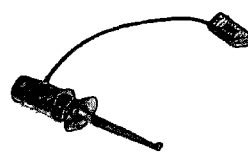
This connector supports non-grounded BNC connections. One end is BNC male and the other end consists of two open wires.

N1295-61701 Cable Plug-Plug:



The plug-plug cable for N1295A.

N1295-61702 Cable Plug-Clip:



The plug-clip cable for N1295A.

U3606-60030 Alligator clips:



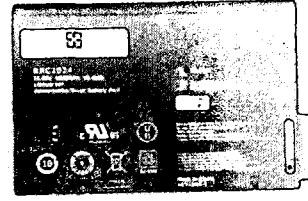
U3606-60030 includes one red and one black alligator clips with boots. These are included in the U8201A and U8202A. The alligator clips support CAT III 1000 V, 10 A.

16435A Interlock cable adapter set:



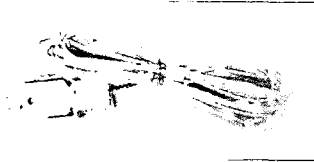
This adapter converts the 6 pin interlock connector of the N1294A-011 interlock cable to BNC female output.

N1418A Lithium-ion battery



Lithium-ion rechargeable battery for the B2983B/87B.

N1423A Thermocouple:



K-type thermocouple (3.5 m) for the B2985/87B.

Drift

Accessories available from the other manufactures

This table contains reference information on B2900B/BL compatible accessories available from third party manufacturers.

Note: This information does not constitute an endorsement by Keysight for any of these items.

Short description	Vendor	Model	Additional information
Adapter-BNA BNC Jack	POMONA	1269	This adapter converts banana output terminals to a BNC female terminal.
Plug-Banana Double	POMONA	MDP-0	This plug is used to connect wires to the banana output terminals.
Double banana – BNC (f)	Fluke	PM9081	This adapter converts the banana output terminal to a BNC jack terminal. The outside metal is insulated for safety.
BNC cable	POMONA	72926-C-80	The outside of the BNC connector of this cable is insulated.
Banana - BNC cable	POMONA	72927-C-80	The outside of the BNC connector of one end of this cable is insulated. Other end is insulated banana plugs.
D-sub 25-pin male connector kit	Amphenol	L717D B25P ST3	The male D-sub connector. A unique cable, which interfaces to the instrument's digital I/O, can be assembled using this D-sub male connector. It is compatible with the B2901/10BL, B2901/02/11/12B and the B2961/62B..
D-sub 25-pin female feed-through	Amphenol	L717-DB25P	A female D-sub connector feed-through for use with customized test fixtures, it mates with the L717D B25P ST3 D-sub 25-pin male connector.
Humidity sensor	E+E Electronik	EE07	The B2985/87B supports the EE07 Digital Humidity/Temperature Probe from E+E Electronik. The EE07-PFT1 is recommended for standard applications and the EE07-MFT9 for clean room applications, food and pharmaceutical industry applications.
Benchtop battery charger	RRC POWER SOLUTIONS	RRC-SMB-UBC	Benchtop battery charger for N1418A

B2900 Precision Instrument Family

The B2900 family contains products that perform both precision sourcing and precision measurement. www.keysight.com/find/b2900

Learn more at: www.keysight.com

For more information on Keysight Technologies' products, applications or services, please contact your local Keysight office. The complete list is available at: www.keysight.com/find/contactus



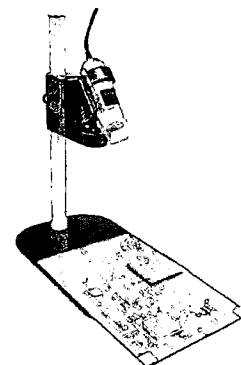
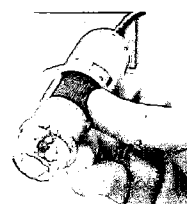
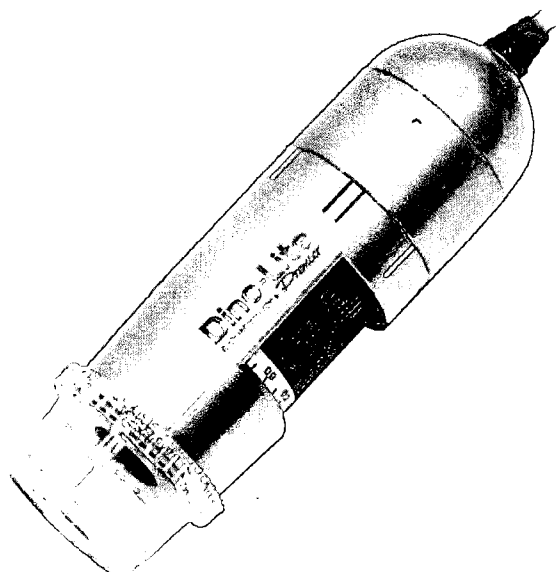
Find us at www.keysight.com



AM4113ZTL

\$549

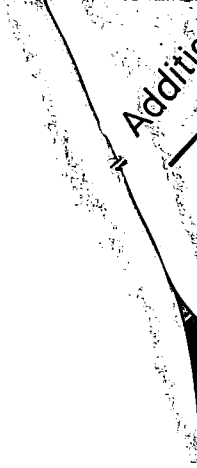
Product Images



Description

The Dino-Lite AM4113ZTL handheld digital microscope features longer working distance with an adjustable polarizer, and a 1.3MP sensor for a resolution of 1280 x 1024. This model has variable magnification depending of distance with longer working distances compared to standard models and a magnification range of 10x - 90x. Dino-Lite models with longer working distances are great for applications that require a certain space between object and microscope to either work under or require a certain distance to view. With the adjustable polarizer, you can adjust the amount of glare that reflects from what you are viewing, so you can see fine details of surfaces by fully or partially removing the reflection of semi-transparent materials like; jewelry, glass, or plastic. It is also ideal for

examining highly reflective materials, such as metals or solder joints.



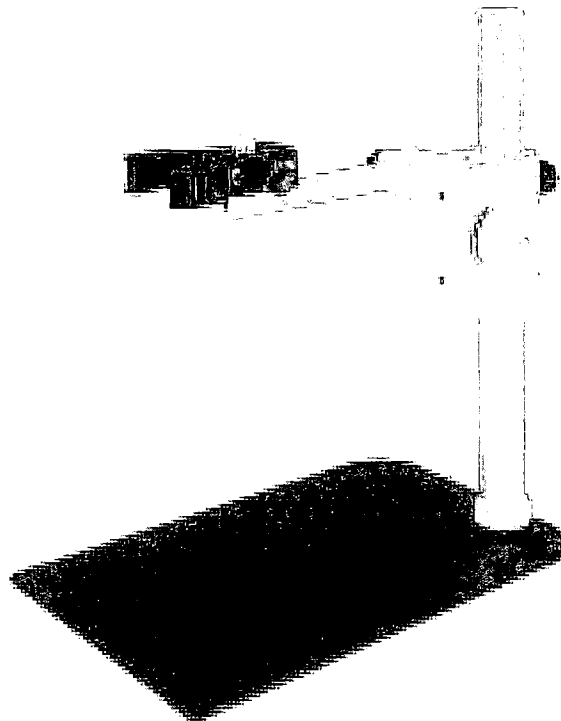
Additional Information

Measurement	Yes
Flexible LED Control	No
Automatic Magnification Reading	No
Extended Depth of Field	No
Enhanced Dynamic Range	No
Wireless Ready	No
Magnification Lock	Yes
Body Material	ABS Plastic
Microtouch Sensor	Yes
LEDs	White (8)
Axial	No
Polarization	Yes
Excitation Wavelength (LED)	N/A
Emission Wavelength (Filter)	N/A
Magnification Range	10x - 90x
Working Distance	Long
Lens Type	Glass
Megapixels	1.3 MP
Image Save Formats (Windows)	BMP, GIF, PNG, JPG, TIF, RAS, PNM, TGA, PCX, MNG, WBMP, JP2, JPC, PGX
Image Save Formats (Mac OS)	JPEG, PNG
Video Save Formats (Windows)	WMV, FLV, SWF
Operating System	Windows XP, Vista, 7, 8, 10, 11, Mac OS 10.5+
Connection Type	USB 2.0
Included Software	DinoCapture 2.0 (Windows), DinoXcope (Mac OS)
Imaging Standards	UVC
Sensor Type	CMOS
Resolution	1280 × 1024 pixels

Frame Rate (max)	30 FPS
Dimensions	10.5cm (L) x 3.2cm (D) (4.13" x 1.26")
Weight	105g (3.7 oz)
Cable Length	182cm (71.65 in)
Package Includes	Microscope, Carry Pouch, Software CD, Standard Calibration Target
Warranty Period	2 years
Manufactured in	Taiwan
Service & Support	U.S. (www.dinolite.us) English & Spanish
Regulatory Approval	CE, FCC



RK-06A

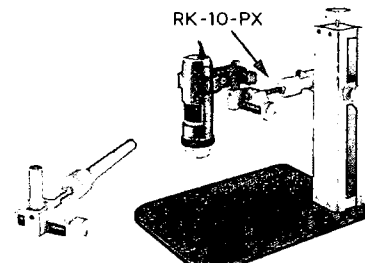
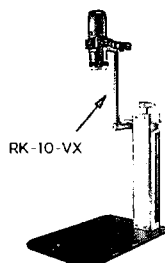
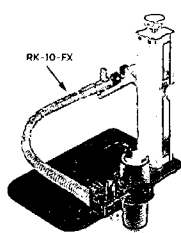
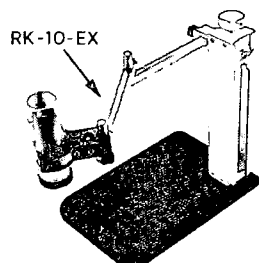


The Dino-Lite RK-06A stand is a sturdy and stable mid-range stand solution that can be used with all Dino-Lite digital microscopes. It is constructed of stainless steel and lightweight aluminum and offers precise fine-focus adjustment as well as a quick vertical release function.

Its adjustable horizontal arm has a 15cm range with 360-degree rotation and with the RK-10-EX arm (included) its effective range can be extended to observe larger objects. Various optional accessories are available for the RK-06A, such as the RK-10-FX flexible arm or the RK-10-PX, XY arm. With these features, the RK-06A is the ideal mid-range stand solution for precise orientation and maximum flexibility.

» Available extensions for the RK-06A stand

- **RK-10-EX:** additional horizontal arm (included)
- **RK-10-FX:** flexible arm extension
- **RK-10-VX:** vertical arm extension
- **RK-10-PX:** XY positioning arm with accurate and smooth adjustment options, designed for all sorts of applications that require fine examination with a X- and Y-axis movement.



Additional Info

- Accessories range: Professional stands
- Dimensions: 22 cm (L) x 15 cm (W) x 27 cm (H)
- Weight: 1060 g
- ESD Safe: No
- Compatible with: All Dino-Lite models
- Package contents: Stand, HD-P1 holder, RK-10-EX horizontal arm

• Details

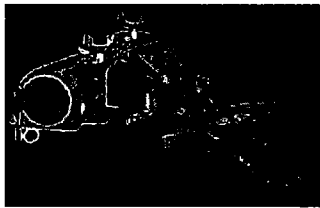
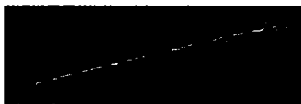
- Accessory range: Professional stands
- ESD-Safe: No
- Dimensions: 22 cm (L) x 15 cm (W) x 27 cm (H)
- Weight: 1060 g
- Compatible with: All Dino-Lite models
- Package contents: Stand, HD-P1 holder, RK-10-EX horizontal arm
- Warranty: 1 year European warranty
- Accessory type: Professional stands
- ESD-safe: Yes

Elite 300 and Summit DC Probes

139-331 — Coaxial Probe (Straight)

Features

- Shielded DC measurements with coaxial probe
- Straight configuration for multiple probing applications when using straight or 45° needles for steep access
- Easy probe needle replacement without tools
- Compatible with all PTT series probe needles
- Replaceable SMA cable
- Easy connection to Elite 300 coax connection panel on platen



Two (2) DPP2xx positioners and universal probe mounts, one using the straight coax probe with straight needle, and the other using a bent coax probe with 45° bent PTT needle

Kit Contents

- Straight shielded probe
- Integrated SMA (f) connector
- Shielded coaxial cable, 30-inch with SMA (m) to BNC plug

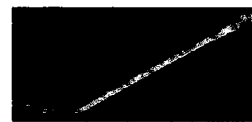
Compatibility

- Elite 300, Summit

139-870 — Coaxial Probe (Bent)

Features

- Shielded DC measurements with coaxial probe
- Bent configuration for increased microscope objective clearance with high magnification/low working distance objective lenses
- Easy probe needle replacement without tools
- Compatible with all bent PTT series probe needles
- Replaceable SMA cable
- Easy connection to Elite 300 coax connection panel on platen



Coaxial probe (bent) with 45° PTT needle, shown attached to universal probe holder and DPP2xx positioner.

Kit Contents

- Bent 35° shielded probe
- Integrated SMA (f) connector
- Shielded coaxial cable, 30-inch with SMA (m) to BNC plug

Compatibility

- Elite 300, Summit

144-390 — Triaxial Probe (Straight)

Features

- Guarded DC measurements with triaxial probe
- Integrated triaxial cable for low-noise measurements
- Easy connection to Elite 300 triaxial connection panel on platen
- Straight configuration for multiple probing applications when using straight or 45° needles for steep access
- Easy probe needle replacement without tools
- Compatible with all PTT series probe needles



Kit Contents

- Straight triax probe
- Integrated triaxial low-noise cable, 30-inch with triax (m) connector

Compatibility

- Elite 300, Summit

Positioners and Positioner Accessories

DC Positioners



NOTE

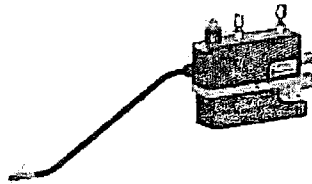
Positioner movement ranges specified here may be further limited by specific application setups.

ENTRY LEVEL

DPP105-M/V-AI-S

Features

- Low cost probing
- Extremely small footprint
- Probe-tip pressure adjustment
- Single arm with gold-plated clamping included
- Suitable for probing pads down to 100 x 100 µm



Specifications

- Travel Range:
 - X: 8 mm
 - Y: 6 mm
 - Z: 25 mm (z-axis control: cw=down, ccw=up)
- Resolution:
 - Feature Resolution: 5 µm
 - Screw Resolution X 350 µm/rev (70 TPI)
 - Screw Resolution Y 500 µm/rev (50 TPI)
 - Screw Resolution Z 70 µm/rev (350 TPI)
- Base: Magnetic or Vacuum
- Footprint Dimensions: 60 x 20 mm

Compatibility

Open Platform Bundles

- PM5
- PM8
- PM300
- PA200
- PA300

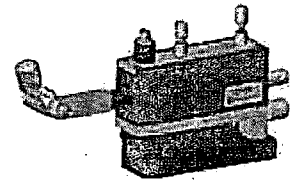
Ordering Information

Standard (z-axis: cw=down, ccw=up)	Legacy (z-axis: cw=up, ccw=down)
DPP105-M-AI-S	133346
DPP105-V-AI-S	100298

DPP105-M/V-PTH

Features

- Low cost probing
- Extremely small footprint
- Probe-tip pressure adjustment
- Compatible with PTT needle holders
- Suitable for probing pads down to 100 x 100 µm



Specifications

- Travel Range:
 - X: 8 mm
 - Y: 6 mm
 - Z: 25 mm (z-axis control: cw=down, ccw=up)
- Resolution:
 - Feature Resolution: 5 µm
 - Screw Resolution X 350 µm/rev (70 TPI)
 - Screw Resolution Y 500 µm/rev (50 TPI)
 - Screw Resolution Z 70 µm/rev (350 TPI)
- Base: Magnetic or Vacuum

Compatibility

Open Platform + PTH Arms

Summit

Ordering Information

- DPP105-M-PTH
- DPP105-V-PTH